Iliac crest apophyseal insufficiency avulsion fractures

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ABSTRACT

Iliac crest apophyseal avulsion fractures are rare injuries caused mainly through forceful contraction of attached muscles during high level sporting activities. We present the first case of a spontaneous iliac crest apophyseal avulsion insufficiency fracture in a patient with severe atopic eczema on oral steroids and review the relevant literature.

KEYWORDS

Apophyseal fracture – Avulsion fracture – Iliac crest – Insufficiency fracture – Corticosteroids

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Introduction

Acute pelvic apophyseal avulsion fractures in children and adolescents are rare injuries. They are usually caused by a sudden forceful contraction of attached muscles around the pelvis during sporting activities.^{1–5} The iliac crest apophysis serves as an attachment site to the abdominal muscles: the internal oblique, external oblique and transverse abdominis muscles. Patients with these fractures present with acute localised pain and tenderness. Plain radiography is the initial investigation of choice to confirm the diagnosis and assess displacement. The management is generally non-operative with analgesia and activity modification.¹

We present an unusual case of a spontaneous iliac crest apophyseal avulsion fracture in an adolescent with atopic eczema treated with oral corticosteroids. To our knowledge, this is the first case of a spontaneous non-traumatic iliac crest avulsion fracture to be reported in the literature.

Case history

A 14-year-old girl presented to emergency department with sudden onset of pain in her right pelvis and inability to weight bear while walking on her way back from school. There was no history of trauma, running or sprinting. Prior to this presentation, she had had no musculoskeletal symptoms or any constitutional symptoms of malignancy. Her past medical history included severe atopic eczema for over two years for which she had been receiving specialist treatment in the dermatology clinic. This included longstanding prednisolone 30mg once daily (multiple courses), Fucibet® (LEO Pharma, Copenhagen, Denmark) cream (betamethasone, fusidic acid) applied topically twice daily and Epa-derm® (Mölnlycke, Oldham, UK) emollient (white soft

paraffin) three times per day. On examination, she had superficial bruises and localised tenderness over the right iliac crest.

Plain radiography of the pelvis (Fig 1) demonstrated an avulsion fracture of the iliac crest. The patient's blood tests and inflammatory markers (including erythrocyte sedimentation rate and C-reactive protein) were unremarkable. Magnetic resonance imaging (MRI) of the pelvis (Fig 2) demonstrated high signal and intense oedema around the iliac crest apophysis. Along with the clinical findings, these radiological findings were suggestive of a spontaneous avulsion fracture of the iliac crest. She was treated non-operatively with analgesia and activity modification, and mobilised as tolerated with crutches. Interval gadolinium enhanced MRI (Fig 3) was undertaken to rule out any cystic/space occupying lesions or features suggestive of malignancy such as Ewing's sarcoma. This showed significant improvement and reduced oedema. At the five-month follow-up review, she was asymptomatic and had returned to normal activities. Her plain pelvic radiography (Fig 4) showed a healed iliac crest apophyseal fracture at the final follow-up appointment.

Discussion and literature review

The ossification of the iliac apophysis occurs gradually from anterolateral to posteromedial. The cartilage becomes fully ossified around the age of 14 years in girls and 15 years in boys. However, fusion of this ossified cartilage with the iliac bone occurs around the age of 16 years but could continue to the age of 25 years.^{2,4–6} Over the intervening period, the ossified cartilage is therefore subject to trauma that could cause its displacement by forceful contraction of the attached abdominal muscles during sporting activities.

Figure 1 Anteroposterior pelvic radiography at initial presentation demonstrating right iliac crest apophyseal avulsion fracture (arrow)

Figure 3 Gadolinium enhanced coronal and axial magnetic resonance imaging of the pelvis at three months demonstrating minimal oedema around the iliac crest apophysis, which has significantly improved compared with initial imaging (Fig 2), with no enhancing mass lesions

Figure 2 Coronal and axial T2 weighted magnetic resonance imaging of the pelvis with intense oedema around the iliac crest apophysis suggestive of acute avulsion fracture (arrows)

Figure 4 Anteroposterior pelvic radiography at final follow-up visit demonstrating healed right iliac crest apophyseal avulsion fracture

The literature only reports on traumatic causes of iliac crest apophyseal avulsions, mainly sporting injuries.^{7–11} Schuett *et al* published the largest retrospective review of 225 patients with pelvic apophyseal avulsion fractures with a mean age of 14.4 years.¹ They found the anterior inferior iliac spine avulsions to be most prevalent (49%). This was followed by anterior superior iliac spine (30%), ischial tuberosity (11%) and iliac crest (10%) fractures. In Rossi and Dragoni's review of 203 avulsion fractures of the pelvic apophyses in adolescent competitive athletes, only 3 were in the iliac crest apophysis.² Other small series have also reported rare cases of iliac crest avulsion fractures.^{6,12}

Our patient had no history of sporting activity or trauma. She was walking with normal speed on a flat pavement on her way back from school when she had the sudden onset of pain. At the time, she was on her sixth course of oral prednisolone (30mg per day) for her atopic eczema but was systemically well otherwise.

Van Staa *et al* estimated the risk of fractures in children aged 4–17 years using the UK's General Practice Research Database.^{15,14} They reviewed the medical records of children taking oral steroids ($n=37,562$) and those taking non-

systemic corticosteroids ($n=545,748$). Fracture risk was increased among children using 30mg prednisolone or more each day (adjusted odds ratio [OR] for fracture: 1.24, 95% confidence interval [CI]: 1.00–1.52) and among those receiving four or more courses of oral corticosteroids (OR: 1.32, 95% CI: 1.03–1.69). However, it is unclear whether this relates directly to oral corticosteroid use or the underlying conditions.

Furthermore, low bone mineral density has been reported in up to 30% of adult patients with moderate to severe atopic dermatitis as a result of the cumulative dose of topical and systemic corticosteroids.¹⁵ In a study of children aged 5–16 years with moderate to severe atopic dermatitis, the cumulative use of topical corticosteroids over the previous 5 years was not associated with a decrease in bone mineral density.¹⁶ Conversely, when children received additional systemic treatment, their bone mineral density decreased although the decrease was not statistically significant compared with the general population.

Conclusions

Our patient had been receiving intermittent systemic corticosteroid treatment of over two years to control her severe atopic eczema. This may have contributed to this unusual insufficiency avulsion fracture of her iliac crest apophysis. Her fracture has now healed with simple conservative measures. We believe a decrease in bone mineral density to be a rare side effect of use of systemic corticosteroids. Children treated with systemic corticosteroids and their families should be warned and appropriately counselled about such possible rare side effects.

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