CASE REPORT

"Goalkeeper's hip": acute haematogenous osteomyelitis secondary to apophyseal fractures

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We report two cases of acute haematogenous osteomyelitis in the anterior superior iliac spine (ASIS) in adolescent goalkeepers following trauma of the iliac crest apophysis. Both patients complained of pain over their right ASIS and were pyrexial. They were given antibiotics and were discharged from follow up without complication 64 and 90 days after starting treatment.

A 14 year old male presented 2 days after injury playing football as goalkeeper. He had fallen injuring his right iliac crest, but despite pain was able to continue with the game. However, 48 h after injury he was admitted complaining of increasing pain at the right anterior superior iliac spine (ASIS) and was noted to be pyrexial. Passive hip movements were restricted and flexion of the right hip produced simultaneous external rotation. There was tenderness localised to the right ASIS. The patient's C-reactive protein (CRP) was elevated (132 mg/l). X rays showed an avulsion of the right iliac crest apophysis. His pyrexia continued and blood cultures grew *Staphylococcus aureus*. Flucloxacillin 1 g four times a day was added to his analgesics; his clinical condition improved markedly after the introduction of antibiotics. By the third day of treatment, his pain had improved and his temperature had settled. Blood parameters at this time showed white cell count (WCC) 6200, erythrocyte sedimentation rate (ESR) 22 mm/h, and CRP 119 mg/l. An isotope bone scan showed increased activity at the right anterior superior iliac spine (fig 1). The patient was completely asymptomatic (WCC 4200, ESR 6 mm/h, CRP 21 mg/l) 26 days after treatment had started. Antibiotics continued for 6 weeks. The patient was discharged from follow up without complication 64 days after presenting to the hospital.

A second 14 year old boy presented 24 h after injuring his right iliac crest playing football as goalkeeper. He awoke the morning after the game with pain over his right ASIS. Examination revealed right ASIS tenderness associated with restricted right hip movements. On admission the patient was pyrexial (38.4°C, CRP 3 mg/l, WCC 5300) and blood culture examination was initially negative. An initial diagnosis of traction apophysitis or apophyseal fracture was made despite normal looking x rays of the pelvis. However, because of the severe pain and the raised temperature, a possibility of early osteomyelitis was considered and prophylactic flucloxacillin was given (1 g four times a day orally). A further rise in temperature at 48 h after admission was noted. CRP was measured at 63 mg/l with blood culture growing *S aureus*. Fucidin was added to the regimen. The patient's symptoms dramatically improved with the introduction of the second antibiotic. An isotope bone scan was suggestive of osteomyelitis at the right ASIS. An MRI scan (fig 2) showed no focal abscess formation but did show signs

consistent with infection in the right iliac crest. The patient was asymptomatic (CRP 3 mg/l) 14 days after treatment had commenced. Antibiotics continued for 5 weeks and the patient was discharged from follow up 90 days after starting treatment.

DISCUSSION

Osteomyelitis is a rare complication of closed fractures treated conservatively.¹ The few reports in the literature are mostly case reports.¹ The role of trauma in the aetiology of osteomyelitis has been debated.^{2,3} Injury to the epiphyseal plate has been shown to produce changes to the microenvironment of the growth plate rendering it susceptible to infection.⁴ Bacteraemia itself is usually insufficient to initiate osteomyelitis in normal bone⁵ but may do so in the presence of trauma.⁶ Whalen *et al* have suggested that the latter observation results from a delayed inflammatory response after trauma, allowing bacterial proliferation and destruction of local tissues.⁶ We believe that our patients must have had a clinically non-significant bacteraemia at the time of injury; the haematoma associated with the fracture as well as the altered micro-environment at the fracture site were sufficient to establish an infection. Hedstrom *et al* suggested that bacteria were haematogenously spread from skin lesions to aseptic inflammatory areas around muscle attachments but were unable to prove this.⁷

It has been reported that there is an association between this form of osteomyelitis and football injuries.⁷ Both our patients were goalkeepers and we hypothesise that their apophyseal fractures occurred secondary to impact of the iliac crest with the ground. However, the source of the bacteraemia was not clear as neither patient had an obvious skin lesion or any other potential source of inoculation.

Figure 1 Isotope bone scan of the first patient showing increased activity at the right anterior superior iliac spine.

Figure 2 T1 and T2 MRI scan of the second patient showing disruption of the right iliac crest apophysis and signs of osteomyelitis in the right iliac crest.

We believe that the clinical data, radiological evidence, and rapid improvement in the patients after the introduction of antibiotics all point towards infection secondary to closed fracture. The likely propagation of such an infection is described above.

We believe that in the presence of a closed fracture where no other obvious infection is apparent (for example, chest infection, UTI, etc), the presence of bone infection should be considered. MRI is the investigation of choice to determine the presence of infection. If clinical status permits, a biopsy should be taken before starting antibiotic therapy. We suggest a minimum of 6 weeks antibiotics for such infections. Failure to diagnose and treat such injuries complicated by infection could lead to chronic osteomyelitis, bone destruction, or septicæmia.

The prognosis for such infections in children is good.¹ Although osteomyelitis is a rare complication after a closed injury, the presence of pyrexia or increasing pain after treatment of a closed bony injury should alert the clinician to this possible complication.

What is already known on this topic

- Osteomyelitis after closed injuries is rare
- These infections often present late and with significant long term sequelae and morbidity

What this study adds

- This study highlights the need for vigilance in approaching closed fractures in children
- The apophyses are a potential area for infection and these cases highlight that such infections can be established even after relatively trivial injuries
- These cases show that early awareness and treatment of such infections can prevent more dramatic long term sequelae

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Informed consent was obtained for publication of both patients' details in this report

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