Avulsion fracture of the ischial tuberosity in adolescents—an easily missed diagnosis

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Lesson of the week

Avulsion fracture of the ischial tuberosity in adolescents—an easily missed diagnosis

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Avulsion fracture of the ischial tuberosity is a rare injury in comparison with mid-substance tears of the hamstrings, and its diagnosis is often missed. Such fracture usually occurs between puberty and late adolescence in those who do a lot of sport—it is in puberty that the secondary ossification centre or apophysis appears and in late adolescence that it fuses. In other words, fracture occurs at a time when the apophysis is the weakest link in the chain of muscle, tendon, and bone. The cause is usually forcible contraction of the hamstrings, as in sports such as sprinting and hurdling.

In adolescent patients with a history of proximal hamstring injury and current ischial tenderness, a radiograph of the pelvis should be performed. This is to exclude the presence of an avulsion fracture, which may be substantially displaced.

A prompt diagnosis of a displaced avulsion fracture of the ischial tuberosity will enable early surgery where appropriate. This in turn will prevent the development of chronic pain on sitting and walking and an inability to return to sporting activities.

Case reports

Case 1

A 14 year old boy was sprinting during a 200 m race when he suddenly developed a severe pain posteriorly in the proximal part of his left thigh. He collapsed to the ground in pain and could not complete the race.

His general practitioner advised him to rest to allow the presumed hamstring injury to settle. Despite prolonged physiotherapy, he still had pain when he jogged. Two years after the injury, he was referred to a rheumatologist in case the pain was caused by sciatica. Radiography of the pelvis showed a non-union of the left ischial tuberosity, with marked displacement of the apophyseal fragment (fig 1). A specialist orthopaedic opinion was urgently sought; clinical examination showed substantial wasting of the hamstrings accompanied by weakness and pain on resisted knee flexion.

Three years after the injury an operation was done using the posterior Kocher-Langenbeck approach. The non-union was mobilised, reduced, and internally fixed using a reconstruction plate and screws. Two months later, he was comfortable apart from some pain on sitting. At five months postoperatively he was walking normally and was able to jog, and at one year he had returned to full sporting activities, including sprinting. Pelvic radiography showed bony union (fig 2).

Case 2

During a football game, a 15 year old boy stretched to kick the ball with his left foot. He instantly felt a severe pain in his left buttock and had to be carried off the pitch. He was told he had "pulled a muscle," and

Fig 1 Case 1: Anteroposterior pelvic radiograph, two years after injury, showing mobile non-union of left ischial tuberosity

Perform pelvic radiography in adolescents with history of proximal hamstring injury and current ischial tenderness

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although he had difficulty walking, he did not seek medical attention for a month. Three months later his general practitioner ordered pelvic radiography and, on the basis of the result, sought an orthopaedic opinion. By this stage the patient's symptoms were restricted to pain when running and discomfort after sitting for long periods. The orthopaedic surgeon continued to use conservative treatment, but the symptoms were no better a year later. The opinion of a surgeon specialising in pelvic trauma was sought; on clinical examination, there was evidence of substantial hamstring wasting and tenderness over the ischial tuberosity.

Two and a half years after the injury an operation was done using the posterior Kocher-Langenbeck approach. A firm fixation was achieved with a reconstruction plate, although it was not possible to close the fracture interval completely on the medial side. This gap was packed with bone graft from the greater trochanter. Two months later the patient was free of symptoms and had a full range of hip movement. When he was seen six months postoperatively he was walking normally. However, the two inferior screws had broken, and he had further surgery to revise the fixation. Four months after the second operation the fracture was progressing to union, and he had returned to limited sporting activities, such as swimming, without symptoms.

Case 3

During a gymnastics routine, a 15 year old girl did "the splits." She felt a sudden and severe pain in her left buttock and could not continue with the routine. Over the following days she was treated with rest, ice, and non-steroidal anti-inflammatory drugs. Within a few weeks she could walk normally but could not run, engage in any sports, or sit for long periods. She was referred for an orthopaedic opinion 15 months after her injury, and at this stage anteroposterior radiography showed a non-union of an avulsed and displaced ischial apophysis. She had further conservative treatment in the hope that the non-union would ossify. In fact, her symptoms worsened over the following six months, and she was referred to a surgeon specialising in pelvic trauma. Clinical examination showed tenderness over the fracture and weakness and wasting of the hamstrings on that side.

Two and a half years after the injury open surgery was done using a direct approach through the gluteal crease. A secure fixation was achieved using a five-hole reconstruction plate. The fixation was augmented with bone graft from the posterior iliac crest.

Three months after surgery, repeat radiography showed union of the fracture. The patient could walk normally and was free of symptoms. She was therefore encouraged to increase her level of activity. At review one year later, her fracture had fully healed and she had returned to full sporting activities.

Fig 2 Case 1: Anteroposterior pelvic radiography, one year after surgery, showing bony union

Discussion

The history and clinical picture of avulsion of the ischial apophysis closely mimics that of a hamstring injury. Hamstring rupture seems to have been diagnosed in each of these cases, with the adoption of a "watchful waiting" policy This led to a false sense of security about the patient's likelihood of recovery. Misdiagnosis is more likely if the patient is not examined specifically for tenderness at the ischial hamstring origin.

Recognition of the fracture and the extent of displacement is important, as this will alter the management of the patient. This is the case even with an undisplaced fracture, as a longer period of rehabilitation will be necessary[1] and hamstring stretching may have to be avoided for some weeks. Therefore radiography should be done in all patients who exhibit bony tenderness, or a palpable gap, at the site of the hamstring origin. In the absence of a fracture visible on an x ray film, magnetic resonance imaging may also be helpful to show any soft tissue injury that may require repair, such as an avulsion of the conjoined tendon of the hamstring muscles, with or without a sleeve of periosteum.[2]

If substantial displacement is present, a specialist orthopaedic pelvic surgeon may consider reducing and fixing the avulsed fragment immediately to prevent the development of a mobile non-union and substantial pain and weakness, which prevent the patient returning to sports or even normal pain-free walking.[3 4] Several reports have been published about patients with symptoms similar to those described above, either after intentional and aggressive non-operative management or after missed diagnoses.[5–7]

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