AVULSION OF THE ISCHIAL APOPHYSIS

THE CASE FOR OPEN REDUCTION AND INTERNAL FIXATION

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We report three cases of avulsion of the ischial tuberosity with marked chronic disability after delay in diagnosis and non-union of the fracture. All were treated by open reduction and internal fixation with return to full function, allowing in one case, athletic performances of Olympic standard. We also report one patient with an acute apophyseal avulsion treated by early reduction and internal fixation with restoration of full function.

The ischial apophysis may suffer avulsion from the innominate bone from around puberty up to 25 years of age, by which time it has generally fused (Milch 1926; Schlonsky and Olix 1972; Fernbach and Wilkinson 1981). The mechanism of injury is usually sudden contraction of the hamstrings or adductor magnus, the body of the ischium being stabilised by the sacrospinous ligaments to the sacrum (Abbate 1945). Patients are commonly engaged in strenuous activities where there is a high contraction rate or a forceful hamstring stretch such as sprinting, long jumping or hurling (Hamada and Rida 1963; Schlonsky and Olix 1972).

Martin and Pipkin (1957) classified the fractures into apophyseolysis (undiplaced), avulsion fractures (acute), and old ununited avulsions and there is little doubt from previous reports (Hamada and Rida 1963; Howard and Piha 1965; Martin and Pipkin 1957; Metzmaker and Pappas 1985) that conservative management leads to good results if displacement is no more than minimal. Where there is wide separation of the fracture fragments, the natural history is less certain (MacLeod and Lewin 1929; Labuz 1946; Martin and Pipkin 1957; Hamada and Rida 1963; Howard and Piha 1965; Wray 1980; Fernbach and Wilkinson 1981). While bony union may occur, fibrous non-union is more likely (Martin and Pipkin 1957; Schlonsky and Olix 1972); this is often painful, and may enlarge to form an ischial mass (Barnes and Hinds 1972); significant weakness of knee flexion can result (Wilson 1976; Watts 1976). Consequently surgical intervention may be indicated; Howard and Piha (1965) suggested that avulsions with more than 2 cm displacement needed operative reduction and fixation; those with less could be treated conservatively.

Even when a case for surgery can be established, the actual technique has not yet been well defined, and too few cases have been reported to compare the results of internal fixation of the ununited fragment, with those of excision of the fragment and re-attachment of the hamstring origin. It is uncertain whether an athlete with this condition can recover fully after operation (Schlonsky and Olix 1972). We therefore present the results of open reduction and internal fixation in three patients with marked disability after conservative treatment. We also report a patient with wide displacement treated by the early operation which we now advise.

CASE REPORTS

Case 1. A 15-year-old male sprinter presented in 1977 following an injury sustained whilst sprinting six months previously. At the time of injury he heard two cracks followed by moderately severe pain over the left ischial tuberosity. His initial treatment was rest until the pain had subsided and then hamstring rehabilitation. However, he continued to have local pain in both groin and buttock and was unable to run or undertake any sporting activity. Clinical examination on presentation to our clinic demonstrated a gap in the proximal hamstrings and a radiograph showed gross displacement of the avulsed ischial tuberosity. His left thigh was 4 cm thinner
than the right and the power in the hamstring muscles, measured by the Orthotron, was 30% less.

We performed an open reduction and internal fixation of the non-union 10 months after the initial injury, using staples and a wire loop. The fracture subsequently healed by a short fibrous union which became painless over the next six months, during which time the patient regained normal thigh girth and hamstring power. He made a full return to competition achieving his previous levels of performance in the 100 to 800 m events. When reviewed two years later and again 12 years later, he was asymptomatic.

Case 2. An 18-year-old man was injured at long jumping. His initial management was by rest from running for two months followed by hamstring rehabilitation. When seen six months after the injury he was still unable to undertake any sporting activity due to weakness and persistent buttck pain. Radiographs showed a wide fibrous non-union of the apophysis (Fig. 1).

Case 3. A 17-year-old athlete, at that time the New South Wales State sprint champion, avulsed his left ischial apophysis playing rugby football. He felt a crack in the buttck and was unable to walk unaied for two weeks. He presented elsewhere at four weeks with local tenderness and over 30% loss of power: a diagnosis of torn hamstring was made and rehabilitation commenced. When we saw him at three months a gap at the origin of the hamstrings was palpable and a radiograph showed a 5 cm separation of the apophysis.

A week later we performed an open reduction and screw fixation. Nine weeks later he began running but his hamstrings were very tight with a straight leg raise only of 40°. After a hamstring rehabilitation and stretching programme he had, at 12 weeks, achieved a straight leg raise of 80° and normal power. He subsequently recovered his full standard of performance, winning the Australian 200 m title.

Case 4. A 14-year-old rugby league player presented to us acutely with an avulsion fracture of his right ischial apophysis with 3 cm displacement. He remembered a crack as he was sprinting and recalled that his right leg was straight at the time; presumably therefore the mechanism of injury was forceful stretching of the hamstrings. Because of the displacement, his high level of athletic activity and our experience with this injury, open reduction and internal fixation was performed within one week, and within 10 days he was asymptomatic and able to run. He returned to full activities after two months, and by then had full hamstring power. At three

Open reduction and internal fixation was performed eight months after the injury (Fig. 2). Over the next six months his pain on hamstring stretching disappeared; he was able to return to light running at 12 weeks from operation. Despite good bony union he remained locally tender with some pain on sitting for 18 months. These symptoms eventually settled and he was able to return to his pre-injury level of activity. Most of the local pain was from the region of the screws the heads of which could be felt, but he did not consider that the symptoms warranted their removal.
months from operation he broke the high jump record at an inter-school meeting.

**DISCUSSION**

Nonoperative management of displaced ischial apophyseal fractures with fibrous union may lead to significant and prolonged disability (MacLeod and Lewin 1929; Martin and Pipkin 1957; Schlonsky and Olix 1972; Wilson 1976; Watts 1976), including inability to sit comfortably, groin and buttock pain, subjective and objective muscle weakness and reduced athletic ability (Howard and Piha 1965). Our first three cases demonstrate that such a result can occur despite early and adequate conservative treatment, the absence of which has been suggested as a cause of failure (Metzmaker and Pappas 1985). We have also shown that normal function can be restored in chronically disabled patients and that this applies even to elite athletes, a possibility which has previously been open to question (Metzmaker and Pappas 1985). Restoration of hamstring length and elimination of pain on stretching these muscles seem to be the important factors in regaining normal function.

Excision of the tuberischii and re-attachment of the hamstrings has been reported to relieve pain (Schlonsky and Olix 1972; Wray 1980) but it has yet to be established that this method restores normal subjective and objective power. Such treatment may be indicated if the fragment is irreducible, but in our cases we found no difficulty in replacing the apophysis.

Pain from local pressure, as in sitting, persisted in all our patients for variable lengths of time. This eventually subsided and we do not know if the screws were responsible; certainly in no case did the symptoms warrant their removal.

With separation of the ischial apophysis the gap is always palpable; after any suspected hamstring injury it should be sought and a radiograph taken. We believe that in acute cases with separation of more than 2 cm, open reduction and internal fixation is indicated. In chronic cases with disability the same treatment can relieve symptoms and restore full function.

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**REFERENCES**


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