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Avulsion of the ischial tuberosity simulating neoplasm—a report of 2 cases

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Case 1

A 15-year-old boy was referred to us with a radiographic diagnosis of possible bone-forming sarcoma of the right ischium. The radiograms he brought with him showed an irregular bone-forming lesion in the right ischial tuberosity. It was painful and tender to palpation. At first, the patient denied any significant injury. However, careful queries disclosed that he had experienced a popping sensation and sharp pain in the right buttock while he was playing football 4 weeks before. On physical examination, a deep-seated, immobile, 4 cm, painful mass was palpated in the right ischial region. New radiograms of the right ischium showed an irregular bone-forming lesion with areas of destruction in the tuberosity. It seemed to be attached to the ischium and was therefore diagnosed as a possible aggressive neoplasm (Figure 1). However, a CT scan showed a cuff-like ossification in the anterolateral and posteromedial aspects of the ischial apophysis, indicating a healing avulsion (Figure 2). The cortex and trabeculae in this region were preserved. We diagnosed an ischial avulsion. A radiogram taken 6 months later showed the lesion to be solidly united to the ischium (Figure 3). The patient could resume physical activities, including sports, without pain or mass 2 years after the first visit.

Case 2

An 11-year-old boy had a 4-month history of persistent left buttock pain. On physical examination, he had hamstring tightness with positive straight-leg-raising at about 70°. Radiograms showed a honeycomb-like bone lesion at the hamstring origin in the left ischium (Figure 4). The first physician recommended a biopsy for possible neoplastic disease, but he sought a second opinion at our hospital. On the basis of radiographic findings and a history of strenuous running, we clinically diagnosed strain of the musculotendinous unit of common hamstring origin. 3 months later, he was still symptomatic. Radiograms taken at this time showed the development of a honeycomb-like bone lesion now in the right ischium in exactly the same location as in the left ischium. Physical examination showed tight hamstrings and straight-leg-raising at 45° on the right and 55° on the left. On flexion, the fingertips could reach 30 cm from the floor. Family history disclosed that his father and one sister also had tight hamstrings. The tight hamstrings could be stretched by physical therapy and home exercises. At the 16-month follow-up, radiographs still showed bubbly changes in the bone with ectopic ossification (Figure 5). Clinically, however, he was free of symptoms and could bend forward enough to have his fingertips touch the floor with his knees straight. He did con-

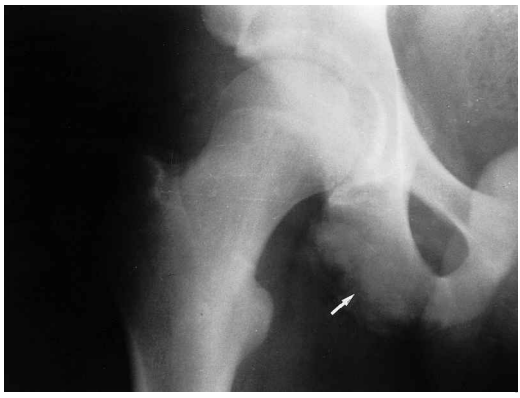

Figure 1. Initial radiograph shows a blastic and lytic lesion in the right ischium with destruction as well as expansion of the bone (arrow) simulating an aggressive benign or malignant bone tumor.

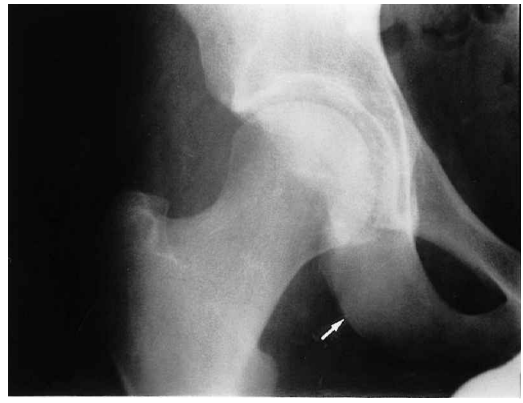

Figure 3. Good union of the avulsion and resolution of the mass (arrow) at 6 months' follow-up.

Figure 2. CT scan shows minimally separated ischial apophysis and ossification adjacent to the anterior lateral (arrow) and posterior medial aspects (arrowhead) of the right ischial ramus, which is consistent with a healing apophyseal avulsion. Note the normal contour of the cortex and medullary cavity of the ischial ramus.

tinuous regular hamstring exercises, and was able to fully resume daily physical activities including competitive sports.

Discussion

Avulsion of the ischial tuberosity typically occurs in childhood and early adolescence when the ischial growth plate is open. The injuries can result from either physical activities in which there is forceful pull on the hamstring origin or chronic repetitive traction without an acute episode. The growth plate or physis is the weakest part of the skeleton and, hence, vulnerable to direct trauma and/or avulsion injuries. Because the hamstring muscles have a broad origin and great power, they may avulse part of the apophysis. Anatomically, such an avulsion cannot occur after closure of the ischial physis, which usually occurs at the age of 25 (Harmada and Rida 1963). The hamstring muscles originate in a conjoined tendon at the posterolateral aspect of the ischial tuberosity and cross the knee joint. Sudden straight-leg-raising with the knee extended and hip flexed, which lengthens the hamstrings, may result in avulsion of their origin.

The diagnosis of ischial avulsion is often delayed, since the injury is considered to be insignificant by the patient, parents, and even treating physicians. The delay in consulting a physician can make the diagnosis more difficult. A radiograph of the acute lesion shows the characteristic crescent-shaped shadow with varying degrees of separation, which lies below, or lateral to the ischial physis. In the subacute phase, however, bone destruction at the fracture site and callus formation may result in a mixed lytic and sclerotic lesion. If connected with the ischium, the lesion may strongly simulate an aggressive bone-forming neoplasm, such as Ewing's sarcoma, lymphoma, or an osteosarcoma (Brander et al. 1995). Biopsy of such a lesion may be confusing (Finby and Begg 1967, Fernbach and Wilkinson 1981, Brander et al. 1995). Histopathological examination 1–2 weeks after fracture shows primitive osteoid and often chondroid and cartilage tissue. It

Figure 4. Initial radiograph shows a honeycomb appearance at the hamstring origin in the left ischium (arrow). With no history of frequent running or hamstring tightness, a neoplasm was considered.

Figure 5. A more stabilized, bubbly appearance with ectopic ossification at the same sites in both ischial tuberosities 16 months after first visit .

may reveal spindle cells with numerous mitoses and ominously plump nuclei, which produce fluffs of osteoid without osteoblastic rimming. This pattern may be similar to that of an osteosarcoma (Mirra 1989). Finby and Begg (1967) reported a case of partial resection of the right ischium with avulsion which had histological findings consistent with malignancy. In the chronic phase, avulsion of the apophysis may heal with bone overgrowth and enlargement resembling a bone-forming neoplasm (Martin and Pipkin 1957, Finby and Begg 1967, Barnes and Hinds 1972, Fernbach and Wilkinson 1981). Barnes and Hinds (1972) excised the overgrown bone because of the possibility of neoplasm.

The initial radiogram of our first case simulated a bone-producing neoplasm with bone destruction. The cortex and medullary cavity were well preserved, favoring the diagnosis of healing callus rather than neoplasm. Although unavailable in our cases, MRI can be of help in evaluation of muscle, tendon, and bone no matter how long after the injury it is performed. Nevertheless, we agree with Brander et al. (1995) who contended that CT is the method of choice for diagnosing a healing avulsion of the ischial apophysis.

The second case is unique in that the patient had tight hamstrings with asynchronous, bilateral, tug lesions and a family history. We believe that the disease in this case resulted from repetitive pulling of hamstrings at their insertion due to frequent running with tight hamstrings. Serial radiographs at first showed bone derangement representing apophysitis, and then a honeycomb appearance, and finally solid ectopic ossification.

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