Case report 785

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Clinical information

A 20-year-old healthy male presented for evaluation of a large bony mass on the right iliac crest. The mass was painless and nonmobile. The patient was seen initially at another institution where a needle aspiration with a nondiagnostic result was performed. The past medical history was significant for a right transperitoneal radical nephrectomy at the age of 13 months for a large Wilm’s tumor, which was followed by cobalt radiation to the right flank and right lower quadrant. The patient received 1300 rads and presumably had a complete cure.

Physical examination revealed slight asymmetry of the pelvis, with the right iliac crest more prominent than the left. A large, painless, bony mass with irregular contour was readily palpable along the inner iliac crest. Normal range of motion was present with no tenderness of the sacroiliac joint.

Radiographs of the pelvis, including computed tomography (CT), showed an irregular bony mass arising from the inner plate of the right iliac wing with foci of calcification noted within the lesion (Figs. 1, 2). A bone scan was obtained which showed only focal increased uptake of the radioisotope in the right iliac wing (Fig. 3). Angiography indicated that the mass was relatively avascular.

Wide resection of the lesion described was performed.

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Diagnosis: Radiation-induced osteochondroma of the ilium

The differential diagnosis included osteochondroma, chondrosarcoma, and radiation-induced neoplasm (e.g., osteosarcoma).

Frozen sections obtained during resection of the mass removed from the right iliac crest showed benign chondromatous tissue. The resected specimen consisted of a portion of the iliac crest with the attached large osteochondral mass. The lesion had a bony surface measuring $10 \times 6 \times 6$ cm in its greatest dimension. Cut sections revealed a large mass attached to the iliac crest, with a base of approximately 2.8 cm. The lesion was composed of cancellous bone of the iliac crest. The entire mass was covered with a cartilaginous cap, ranging from 2 mm to 8 mm in thickness, with focal areas of calcification (Fig. 4). These areas of abnormal bone were observed on multiple cut sections. No areas of necrosis or any other area of abnormal bone were observed.

The patient had an uneventful postoperative course and returned to his previous level of activity.

Discussion

We report here a case of a 20-year-old male who presented with a large osteochondral mass. The bony mass was located in the field of irradiation administered 19 years earlier for a Wilm’s tumor of the right kidney, resected when the patient was 13 months old.

The effects of therapeutic radiation on growing bones are well documented [1, 3, 5, 6, 9]. They include damage to the epiphyseal plate resulting in arrest of growth and/or disorganization of the growth plate. The development of osteochondroma with or without sarcomatous transformation is well known. There is general agreement that the degree of bony changes and possible sarcomatous transformation are directly related to the dose of radiation [5, 9]. Murphy and Blount [6] have indicated that doses of 1600–6425 rads will produce exostoses in children. Our patient received 1300 rads at 13 months of age.

A frequent source of complication of radiation therapy in cases of Wilm’s tumor is the iliac crest with its secondary ossification center. Since the ilium grows principally from the epiphysis of the crest, destruction of this area will result in arrest of growth and subsequent hypoplasia of the ilium. In our patient, hypoplasia was not a problem. Rather, a probable failure of the periosteum around the growth zone to produce a ring of bone occurred. The endochondral bone formation was therefore free to expand in different directions without any confinement, resulting in a large, cartilage-covered osteochondroma of bizarre configuration. The lesion continued to grow until normal skeletal growth ceased. Thus the younger the patient at the time of the radiation, the larger the growth potential for any subsequently developing osteochondroma.

Neuhauser and co-workers [7] have investigated the histologic appearance of radiation-induced cartilaginous exostoses of ribs and ilia. They found no differences between the microscopic appearance of exostoses occurring secondary to radiation and those of the usual idiopathic origin. Resection of the osteochondroma should be considered because of (1) pain due to fracture of the lesion, (2) impairment of articular function, (3) excessive size, (4) unsightly deformity, (5) pressure on neurovascular structures, (6) a sudden increase in size, suggestive of malignant transformation, (7) development of a painful bursa exostotica, and (8) malignant transformation.

While the incidence of malignant transformation in radiation-induced osteochondromas is low [2, 8], recognition of these benign lesions is important in order that their clinical course may be followed. Any bony lesion which appears subsequent to irradiation may have an inherent predisposition to late malignant transformation.

In summary, a case of osteochondroma of the pelvis secondary to radiation therapy after radical nephrectomy for a Wilm’s tumor is reported. The occurrence of such a complication has been discussed. Proof was obtained by open biopsy. The indications for surgical resection of such a tumor were considered. The differential diagnosis, though limited, was discussed.