Primary osteosarcoma of a metatarsal bone

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Abstract
Although osteosarcoma is the most common primary bone malignancy of childhood and adolescence that is not related to marrow cells, involvement of the short tubular bones is uncommon. In contrast to more conventional sites, where the tumor is usually high grade and found in adolescents, osteosarcoma of the small bones is more likely to be low grade, and is often seen in older individuals. We present a case of low-grade primary osteosarcoma of a metatarsal bone in a 25-year-old woman.

Key words
Osteosarcoma · Metatarsal bone · Bone neoplasms

Introduction
Osteosarcoma is the second most common primary malignant skeletal tumor, second only to multiple myeloma. Osteosarcoma usually originates from primitive mesenchymal bone-forming cells in the metaphysis of long bones. It is usually seen in individuals in the second decade of life, most commonly involves the distal femur, proximal tibia and proximal humerus [1], and is usually histologically high grade [2]. Osteosarcoma rarely involves the short bones of the foot or hand [1].

Case report
A 25-year-old obese woman presented with pain in her left foot which was exacerbated with weight-bearing. There was no history of trauma. When the patient had visited her primary care physician 4 years previously with the same complaint, he concluded that the pain was due to her obesity and encouraged her to lose weight. Since that time, the pain had progressively worsened and was not relieved by anti-inflammatory medication.

At the time of her second presentation, physical examination revealed swelling and tenderness of the left third metatarsal. Radiographs showed an expansive lesion involving the bone, extending from the proximal shaft to the subarticular metatarsal head (Fig. 1). There was smooth pressure erosion of the adjacent fourth metatarsal metaphysis. The proximal border of the lesion...
was well defined but not sclerotic, and inhomogeneous matrix mineralization was present. A pathologic fracture of the metatarsal head was present. The proximal margin was well defined, and homogeneous matrix mineralization is present. The uniform expansion of the bone suggests a slow-growing process.

Based on the radiographic features of a slow-growing mineralized lesion, the presumptive diagnosis was enchondroma. The patient underwent curettage of the lesion and, with the same set of surgical instruments, bone was harvested from her iliac crest for grafting. Frozen sections were not obtained. Pathologic examination of the curetted material revealed grade I/IV osteosarcoma.

The patient presented to our institution for definitive therapy 6 months after the initial procedure. At this time, a CT scan of the foot showed a 5 cm long expansile lesion with a fracture of the metatarsal head. Despite a likely incomplete resection at the time of the initial surgery, the graft appeared to be incorporating and there were no focal lytic regions identified. A chest CT scan was negative for metastatic disease. Laboratory studies were within normal limits with the exception of the serum alkaline phosphatase, which was slightly elevated (122 U/l, normal range 35–110 U/l). The patient underwent wide resection of the third ray and wide resection of the iliac crest donor site.

The resected ray showed expansion of the metatarsal bone with replacement of the normal marrow space by tumor. Soft tissue extension of the tumor through the cortex was seen at the distal portion of the specimen (Fig. 2). Microscopic examination revealed grade I/IV osteosarcoma. Nodules of osteoid-producing tumor had expanded and broken through the cortex (Fig. 3). Permeation of the tumor through the trabeculae of marrow bone was present. Tumor osteoid was solid and focally mineralized. Individual tumor cells displayed mildly pleomorphic, hyperchromatic nuclei. Mitotic activity was not increased, attesting to the slow growth of the lesion (Fig. 4). Although the radiographs suggested a cartilaginous neoplasm, the tumor was found to be osteoblastic, without a chondroblastic component. There was no evidence of a benign, pre-existing lesion in the metatarsal bone. The surgical margins were negative for tumor. No tumor was present in the iliac crest resection.

The patient did not receive either chemotherapy or radiation therapy. She has had an uneventful recovery, and is well and disease-free 9 months following ray resection.

Discussion

Osteosarcoma of the short tubular bones is rare. While osteosarcoma in