Primary and Secondary Bone Tumors in the Cat

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- Osteosarcoma
- Parosteal Osteosarcoma
- Chondrosarcoma
- Lymphoreticular Tumors
- Giant Cell Tumors
- Osteomas
- Osteochondromas
- Secondary Bone Tumors
- Nonosseous Tumors Invasive of Bone

Primary and secondary bone tumors are less common in the cat than in the dog. Few detailed reports of these tumors are available, and the only well-documented series of cases are those of Liu (3) and Turrell (6).

The clinical, radiographic, and pathologic appearance of bone tumors in the cat is similar to that in the dog. Diagnosis must be based on a thorough clinical evaluation, accompanied by radiographic examination and confirmed by histopathologic examination of representative samples of the tumor.

Osteosarcoma

Osteosarcoma is the most common primary bone tumor in the cat. The appendicular skeleton is affected more commonly than the axial skeleton, and the hindlimbs are affected more commonly than the forelimbs. The flat bones affected most frequently are those of the skull, the vertebrae, the scapula, and the pelvis. Common longbone tumor sites are the proximal tibia and distal femur and the proximal humerus. Affected cats range in age from 1 year to 20 years, with a mean age of 10 years. More males than females develop osteosarcomas (3) but in our experience no sex predilection is evident.

Clinically, those cases of osteosarcoma involving the limbs show swelling and pain in the area of tumor growth; there is limitation of motion of the associated joint, and progressive muscle atrophy results from disuse of the limb. Tumors arising from flat bones show swelling of the affected area. Those arising from the mandible and maxilla often produce difficulty in chewing. Those arising from the nasal bones produce a discharge from the nostrils. Vertebral involvement often manifests itself as neurologic symptoms. Involvement of the pelvic bones causes difficulty in defecation due to narrowing of the diameter of the pelvis.

Grossly the tumor may be firm or soft, depending on the amount of tumor bone being produced. The lesions are usually invasive and grayish white. Histologically, the tumor cells are fusiform and epithelioid, show marked pleomorphism and mitotic activity, and have an interwoven pattern. Variable amounts of tumor osteoid and bone are produced, but malignant...
cartilage is found infrequently.

Metastasis is less common in the cat than in the dog; metastases originate from appendicular osteosarcomas and not from those of axial origin. (6) Metastasis, when it occurs, is by the hematogenous route to the lungs and internal organs.

**Parosteal Osteosarcoma**

Parosteal osteosarcoma is the second most common tumor in the cat (3, 6) and arises on the outer surface of the cortex of bones. Such tumors have been reported to arise from the humerus and femurs and from the frontal bone and ramus of the mandible. (3) These tumors grow slowly and cause increasing lameness and inability to use the affected limb. Affected animals range in age from 1 year to 14 years, with a mean age of 6.6 years. (6)

Grossly, the tumors occur adjacent to the periosteum, but no cortical involvement is found in early cases. However, in longstanding cases, these tumors may invade the cortex and extend into the medullary cavity. There may be extension into the adjacent muscle tissue. Histologically, there is proliferation of fusiform cells resembling fibroblasts, with production of chondroid and osseous foci. Cellular pleomorphism and mitotic activity are found infrequently.

Parosteal osteosarcomas do not often metastasize. Thus, surgical amputation of the affected limb is usually curative. We have seen a single case of lung metastasis following cortical and medullary invasion.

**Chondrosarcoma**

Chondrosarcoma is an uncommon tumor in the cat. Turrell, (6) in a survey of the literature, found 25 cases. We have seen only two cases. Affected animals range in age from 2 years to 15 years, with a mean age of 8.8 years. (6) The tumor has been reported to arise from the scapula, humerus, skull, femur, foot, tibia, and pelvis. The two cases we have seen arose from the tibia and humerus.

Chondrosarcomas are firm, rapidly growing masses attached to the underlying bone; they cause lameness and are painful on palpation. Grossly and histologically, the tumor is similar to that described in the dog. Metastasis to the lungs has been found in 10% of the cases. (6)

**Lymphoreticular Tumors**

Lymphoreticular tumors arising as primary tumors in the bone are rare in the cat; a single case has been reported. (7) However, replacement of the hematopoietic tissue by neoplastic lymphoid cells, without any destruction of the cortical or medullary bone as evidenced radiographically or histologically, is common.

**Giant Cell Tumors**

We have seen and there have been reports of giant cell tumors of skeletal origin in the cat. They have been found to involve the distal femur and distal tibia, causing lameness and difficulty in walking. (6) Grossly and histologically, the tumor is similar to that described in the dog. Care must be taken in differentiation of primary giant cell tumors of medullary origin from the giant cell tumor of soft tissue, which may invade the underlying bone.
Osteomas

Osteomas are rare in the cat and arise mainly from the flatbones of the head. Affected animals range in age from 2 years to 12 years, with a mean age of 6.5 years. (6) The clinical, gross, and histologic appearance of osteomas in the cat is similar to that in the dog.

Osteochondromas

Osteochondromas, both the solitary and multiple forms, have been reported in the cat. Solitary osteochondromas are rare and are found in mature cats, arising only on the axial skeleton. (6) No relationship with the feline leukemiavirus has been demonstrated.

Multiple osteochondromas, known also as osteochondromatosis or multiple cartilaginous exostoses, are more common in the cat. (6) Unlike the disease in dogs, horses, and humans, the disease in the cat arises in mature, young adult animals ranging in age from 1.3 years to 8 years. The tumor arises in the perichondnum of flat bones, rather than from long bones. The masses, which appear after skeletal maturity, become larger and increase in number with increasing age of the cat. (6)

The enlarging masses produce functional impairment that varies with the sites involved. Gross and histologic examination shows the lesions to be covered by a cap of cartilage and bone; the underly ing mass comprises bony trabeculae.

Osteochondromatosis in the cat is thought to be viral in origin, with C-type viral particles present within the chondrocytes of these cats. (5) The virus particles are similar to those found in animals with feline leukemia. All cats with osteochondromatosis that have been tested were feline leukemia virus (FeLV) positive. (6)

Secondary Bone Tumors

Secondary bone tumors in the cat are encountered infrequently. (2) These are the tumors that show metastasis from a primary neoplasm elsewhere in the body. The incidence of secondary bone tumors in the cat has not been established, but in our opinion such tumors are rare. We have seen isolated cases of tumor metastasis from primary mammary tumors and squamous cell carcinoma, as well as several cases of primary lung tumors that metastasized to bone. These have been reported by others also. (1,4)

Nonosseous Tumors Invasive of Bone

Nonosseous tumors invasive of bone are as common as primary bone tumors in the cat. (3) Fibrosarcoma and squamous cell carcinoma are the most important tumor types.

Fibrosarcomas invasive of bone are encountered most frequently on the head, with invasion of the mandible, maxilla, and frontal bones. There is extensive destruction of the bone, which is evident on radiographic examination. Invasion and destruction of bones may occur in other areas of the body, but is less common. The gross and histologic appearance of this tumor is similar to that described in the dog.

We have found in a retrospective study that squamous cell carcinoma is a common tumor in the cat, with the oropharynx the most common site of origin. Those tumors arising from the gingiva may invade the underlying maxillary and mandibular bone and appear grossly and histologically similar to the tumors described in the dog. Other sites of squamous cell carcinoma showing invasion of the underlying bone are the digits, frontal sinus, and middle ear.
References


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