History

A 5-year-old ovariohysterectomized female Labrador Retriever was evaluated because of a swelling on the dorsal aspect of the right metacarpal region of several months’ duration. The owner reported that the swelling developed shortly after the dog injured the area by falling through a sea wall at a beach and that since that time, the dog had signs of pain and lameness for several days after it was highly active or sustained any minor trauma to the affected area.

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Clinical and Gross Findings

At the time of the evaluation, the dog was bright, alert, and responsive. A hard mass (4 cm in diameter) was firmly adhered to the dorsal aspect of the proximal portion of the right metacarpal region adjacent to the carpal joint (Figure 1). Mild signs of pain were elicited during manipulation of the mass. No other physical abnormalities were present. Radiography revealed a well-circumscribed, smoothly margined, inhomogeneous bone opacity that was adhered to and protruding from the proximal portion of the third metacarpal bone. Mild bony proliferation was associated with the third carpal bone. The dog was anesthetized for surgery, and the mass was excised and submitted for histologic examination.

Formulate differential diagnoses from the history, clinical findings, and Figure 1—then turn the page →
Histopathologic Findings

Histologic examination of tissue sections revealed a well-delineated, nonencapsulated, multilobulated mass with a 1- to 2-mm-thick, well-defined, continuous, irregular, apical cap of mildly dysplastic hyaline cartilage, which had an orderly pattern of mineralization and transition into mature trabecular bone toward the central and deeper areas of the mass (Figures 2 and 3). Bony trabeculae were slightly irregular in shape and distribution, with wide intertrabecular spaces that contained loose, myxoid tissue or more cellular streams of spindle-shaped cells that resembled fibroblasts. Within these spaces, abundant congested, thin-walled blood vessels with multifocal vascular disruption and perivascular hemorrhage were evident. Bony trabeculae appeared to have been undergoing active remodeling as evidenced by basophilic reversal lines (ie, basophilic cement lines that are wavy rather than smooth and indicate that the previous cellular activity at the site was resorptive), trabeculae that were multifocally lined by a single layer of plump osteoblasts, and scattered osteoclasts within resorption bays (Figure 4). The dorsal surface of the mass had a thin, overlying band of compressed dermal collagen and extended to all surgical margins.

Morphologic Diagnosis

Osteochondroma.

Comments

On the basis of radiographic findings, the differential diagnoses for the dog of this report included periosteal reaction secondary to lick granuloma, multiple cartilaginous exostoses, or neoplasia (including osteochondroma and parosteal or other osteosarcoma). Histo-
logic findings confirmed that the mass was an osteochondroma. Osteochondromas are benign, cartilage-capped, tumor-like exostoses that arise from the surfaces of endochondral bones. They can be monostotic (involving 1 bone) or polyostotic (involving multiple bones). The marrow cavity of these growths is continuous with the marrow cavity of the bone of origin, making them morphologically more suggestive of a dysplastic, rather than neoplastic, process. Nevertheless, malignant transformation within long-standing monostotic lesions can occur, although malignant transformation within monostotic lesions has only been detected in humans. In veterinary medicine, the polyostotic form is more common and has been detected in mature cats as well as young dogs and horses; the age of onset, affected bone, and location along the bone vary depending on the species. In horses, the lesions may be present at birth and are often bilaterally symmetric. In dogs, the lesions are not present at birth but develop in juvenile animals and enlarge in conjunction with skeletal growth. Common sites of osteochondromas in horses and dogs include the metaphyses of long bones, pelvis, ribs, scapulae, and vertebrae. Most lesions are of little clinical consequence, but vertebral lesions can occasionally impinge upon the spinal cord and cause considerable morbidity. The disease characteristics of osteochondromatosis in cats differ somewhat from those in affected horses and dogs, in that lesions develop in mature cats and primarily involve flat bones (including bones of the skull that are formed via intramembranous ossification). In horses and dogs, the disease is inherited as an autosomal dominant trait, as it is in humans. In cats, the etiology is less clear. Because the lesions in cats are slightly different in microscopic appearance (ie, the marrow cavity is not continuous with the bone of origin), compared with findings in the other 2 species, it is likely that the condition in cats is not analogous to that in horses or dogs. Feline leukemia virus particles have been identified within lesions, but the importance and causality of this finding have not been fully elucidated.

Monostotic, solitary, osteochondromas that develop in humans following trauma or whole-body irradiation have been reported. To the authors’ knowledge, no case report of confirmed post-traumatic monostotic osteochondroma in a dog has been published. Debate continues as to whether these lesions represent a neoplastic or simply a dysplastic process. In humans, inactivation of both copies of the EXT gene in growth plate chondrocytes has been implicated in the pathogenesis of both sporadic and hereditary osteochondromas, but this has not been investigated in veterinary patients. The argument for development of post-traumatic monostotic lesions as a result of a dysplastic process is, however, particularly compelling. Experimentally, osteochondromas can develop following transplantation of fragments of physical growth plate to the periosteal surface. In the dog of this report, the proximity of the lesion to the physe of the affected bone and the known history of trauma to the area further supported the diagnosis of post-traumatic monostotic osteochondroma.

References