

## Aneurysmal bone cyst in a dog

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**ABSTRACT.** A one-year-old male mongrel dog was referred to the Veterinary Clinic with a several-week history of lameness and pain of the right front leg. Radiological examination of the right humerus revealed a cystic lesion at the distal end of the bone; the lesion was nodular in a gross appearance. Histologically, the nodular lesion consisted of large areas of haemorrhage and thick fibrous trabeculae mixed with a variably dilated cavernous structure of blood vessels attributed to haemangiosarcoma. Based on these findings, aneurysmal bone cyst secondary to the tumour was diagnosed. — **KEY WORDS:** aneurysmal bone cyst.

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Radiographically, an aneurysmal bone cyst is a circumscribed, smooth-contoured area of radiolucency within a bone; the lesion may be attributed to a variety of substance including tumor tissue, blood tissue, granulation tissue or some other substance less dense than bone [3]. Based on location, anatomical complexity and presumed pathogenesis, bone cysts have been pathologically classified to subchondral bone cysts, unicameral bone cysts and aneurysmal bone cysts [3].

Aneurysmal bone cyst is characterized as a blood containing cyst bulging overlying cortex which visually resembles the saccular protrusion of the aortic wall in a true aneurysm [1]. Grossly, the lesions have a hemorrhagic honeycombed appearance which may reflect the presence of blood-filled vascular channels and sponge-like structure composed of a fibrous or bony trabeculae [1]. Aneurysmal bone cysts have been rarely reported in animals including dog [4], cat [6] and horse [5]. The lesions occur in the end of a long bone near a joint resulting in pain and disability; amputation is necessary if the affected bone shows extreme lysis and destruction. The pathogenesis of aneurysmal bone cyst is unknown; no single cause may be responsible for the lesion [3]. The present case report describes an aneurysmal bone cyst at the distal end of the humerus of a one-year-old mongrel dog.

A one-year-old male mongrel dog was referred to the Veterinary Clinic with a several-week history of lameness and pain of the right front leg. Orthopedic examination revealed tender and swollen distal end of right humerus. Radiographs of the affected area showed a lightly trabeculated cystic lesion at the condyle (Fig. 1). The entire limb was amputated and the humerus was submitted to pathological examination. Macroscopic examination revealed a nodular lesion about 3 cm in diameter at the condyle; the lesion had a blood-filled honeycombed appearance.

Tissue sections were taken from the humerus for light microscopic examination and fixed in 10% neutral buffered formalin. Paraffin sections (5  $\mu$ m) were made and stained with hematoxylin and eosin. For electron microscopy small tissue blocks (1 mm<sup>3</sup>) were taken from the cystic lesion, post-fixed in phosphate-buffered 1% OsO<sub>4</sub> for 1 hr,

dehydrated in ascending concentrations of ethanol and embedded in Epon. Semithin sections (1  $\mu$ m) were stained with toluidine blue and were examined light microscopically. Thin sections were stained with lead citrate and uranyl acetate, and were examined on a transmission electron microscope (JEM-100CXII).

On histological examination, the lesion consisted of large areas of haemorrhage and thick fibrous trabeculae mixed with a variably dilated cavernous structure of blood vessels (Fig. 2). At the periphery of the lesion, there were small clefts composed of immature endothelial cells, which were elongated or varied in size and shape; the nuclei were round or ovoid and very hyperchromatic (Fig. 3). Invasive growth of the neoplastic tissue was found in the epiphyseal cartilage, epiphysis, medullary cavity and joint capsule. Electron microscopy demonstrated electron lucent vesicles resembling pinocytotic vesicles, which are common to endothelial cells, in the cytoplasm of the elongated cells in the neoplastic tissue (Fig. 4).

Septated or bubble-appearing lytic lesion at the distal end of the bone is the characteristic radiographic finding of the aneurysmal bone cyst in both humans and animals; dilated blood-filled, endothelial-lined cavernous sinuses with fibrous or osseous tissue septa is responsible for the

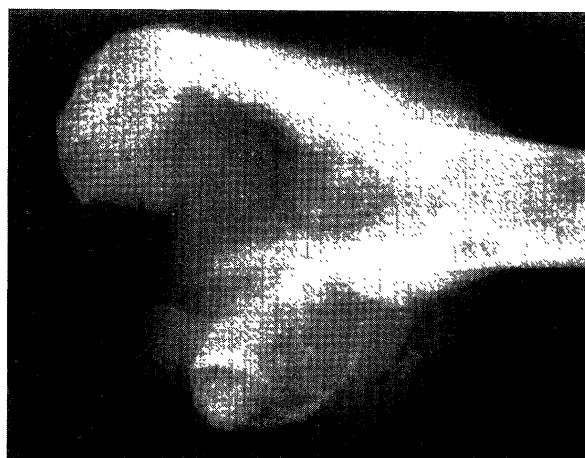


Fig. 1. Posteroanterior radiograph of the right humerus showing a lytic, lightly trabeculated lesion at the condyle.

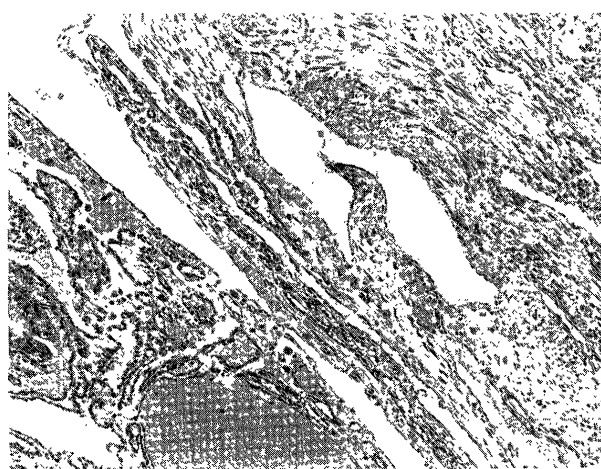


Fig. 2. Histological section of the lesion showing areas of haemorrhage and thick fibrous trabeculae mixed with a variably dilated cavernous structure of blood vessels. HE.  $\times 80$

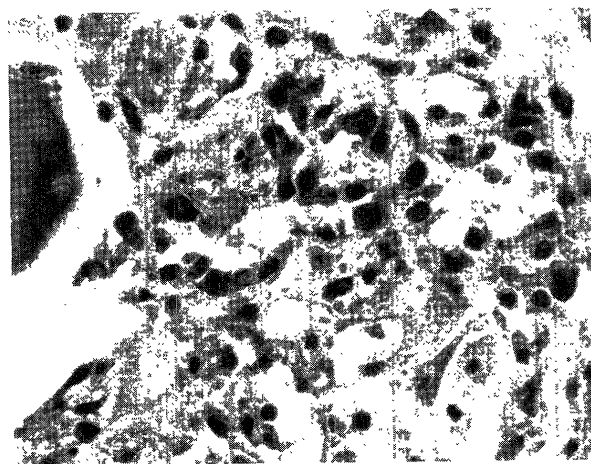


Fig. 3. Higher power magnification of the neoplastic tissue showing small clefts composed of immature endothelial cells. HE.  $\times 640$ .

radiographic finding [2, 4–6]. Macrophages, fibroblasts and occasional multinucleated giant cells may be found in the more solid tissue in the lesion. In the present case, large and small blood spaces were separated by thick connective tissue septa; inflammatory response was minimum in the lesion.

Aneurysmal bone cysts are of primary disease or secondary to haemorrhage resulting from trauma or neoplasms; the lesion may result from any insult that disrupts the circulation of blood through the marrow [3]. Based on the histological and electron microscopic findings, haemangiosarcoma was diagnosed in the present case. In addition, there were large areas of haemorrhage and thick fibrous trabeculae mixed with variably dilated blood vessels containing a plenty of blood. These changes are also indicative of existence of abnormal circulation in the lesion; the neoplastic tissue may be responsible for the development of the aneurysmal bone cyst.

There is no definitive statements relative to pathogenesis,



Fig. 4. Transmission electron micrograph of an immature endothelial cell showing electron lucent vesicles in the cytoplasm.  $\times 10,500$ .

age, breed or site predilection of aneurysmal bone cysts in animals. This is because of scarcity of the reported cases of the lesion in animals. One case report of dog described an aneurysmal bone cyst secondary to osteosarcoma in the distal tibia of an 11-year-old Dalmatian [4]. An aneurysmal bone cyst, which might have resulted secondary to trauma, developed in a 9-month-old Quarter Horse colt [5]. The lesion occurring in the scapula was also reported in a 15-month-old domestic cat [6]. Cooperative research work between the radiologists and pathologists may be necessary in order to understand the precise nature of the lesion.

In human beings, surgical removal followed by bone grafting, cryosurgery and radiation therapy have been used to treat aneurysmal bone cysts [2]. Histopathological evaluation is required for the definitive diagnosis and following proper treatment, because aneurysmal bone cysts can occur secondary to another lesion that have an even more serious implication [4].

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