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# SHORT COMMUNICATIONS

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## Cranial Osteochondroma in a White-tailed Deer (*Odocoileus virginianus*)

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**ABSTRACT:** A large osteochondroma of the skull was diagnosed in a young adult free-ranging white-tailed deer (*Odocoileus virginianus*) from Wyoming. The 4.8-kg neoplasm primarily involved the left frontal bone with extension into the cranial cavity. Microscopically, the neoplasm was composed of well differentiated trabecular bone and islands of cartilage. This neoplasm is rare in domestic species and has not been reported in cervids. Though benign in morphology, the location and size of the neoplasm was probably responsible for debilitation of the deer.

**Key words:** *Odocoileus virginianus*, white-tailed deer, osteochondroma, neoplasia, pathology, case report.

Benign tumors of bony, cartilaginous, or fibro-osseous origin are rare in animals (Misdorp and Van Der Heul, 1976; Pool, 1978). Classification of these neoplasms is contentious and their biology is poorly understood (Pool, 1978; Jubb et al., 1985). Benign skeletal neoplasms have been described infrequently from free-ranging animals (Williams and Thorne, 1988). Surveys of captive wild animals in zoological gardens do not report these neoplasms in the Cervidae (Lombard and Witte, 1959; Effron et al., 1977; Montali, 1980; Griner, 1983).

A 3½-yr-old free-ranging female white-tailed deer (*Odocoileus virginianus*) with a large mass protruding from the top of her head was observed in Park County, Wyoming (44°40'N, 109°10'W) by several ranch families during the summer and fall of 1984. The growth first became apparent in June. She raised two fawns during the summer and then progressively lost weight

to a state of emaciation when she was shot, frozen, and submitted to the Wyoming State Veterinary Laboratory (Laramie, Wyoming 82070, USA) for necropsy. A large, hard, generally spherical mass (16 × 21 × 22 cm; 4.8 kg) protruded from the left side of the head above the eye (Fig. 1). The mass was covered by lightly haired, focally traumatized skin.

The bony mass involved the left frontal bone with extension into the cranial cavity causing indentation of the left cerebral cortex (Fig. 2). The left zygomatic arch was destroyed, a bony protrusion extended into the socket of the left eye, and there was focal involvement of the squamous temporal bone and mastoid process. The



FIGURE 1. Large osteochondroma protruding from the skull of a white-tailed deer.



FIGURE 2. Extension of the osteochondroma (arrow) into the cranial cavity of a white-tailed deer.

cut surface of the mass contained areas of hemorrhage, necrosis, dense bone and fine bone spicules. Other organs in the deer appeared grossly normal.

Seven sections of different regions of the neoplasm and other tissues were fixed in 10% buffered formalin, embedded in paraffin, cut at 6  $\mu\text{m}$ , and stained with hematoxylin and eosin. In densely mineralized areas of the neoplasm, the tissue was decalcified (DECAL, Chemical Corporation, Pomona, New York 10970, USA) prior to sectioning.

Microscopically, the neoplasm was composed primarily of bone trabeculae lined by well differentiated osteoblasts and osteoclasts (Fig. 3). Cartilage was most abundant near the surface of the neoplasm and endochondral bone formation was present (Fig. 4). Mitotic figures in neoplastic cells were rare. A light meshwork of fibrovascular tissue was present between bone spicules. Metastases were not found in regional lymph nodes or other organs.

The neoplasm was considered to be an osteochondroma based on the gross appearance and the presence of well differentiated bone and cartilage though a clearly defined cartilage cap was not apparent.



FIGURE 3. Bone spicules lined by well differentiated osteoblasts in a representative section of the osteochondroma. H&E.

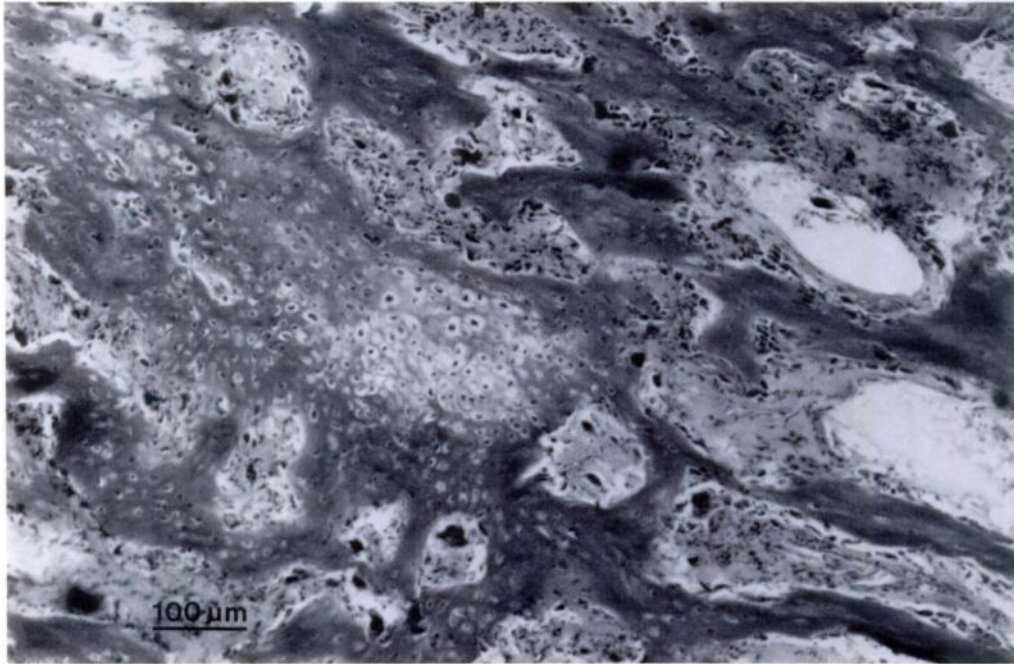


FIGURE 4. Bone spicules and cartilage in a representative section of the osteochondroma. H&E.

Osteochondromas occur in a variety of domestic species (Pool, 1978; Jubb et al., 1985) and frequently involve endochondral bone. In some species, they may be multicentric, heritable, and are often considered malformations rather than neoplasms (Pool, 1978; Jubb et al., 1985). The cause of solitary osteochondromas, such as occurred in this deer, is not known.

This neoplasm also had features that resemble those described for osteoma. Osteomas are rare benign neoplasms of bone that usually arise from cortical surfaces of the skull and facial bones (Pool, 1978; Jones and Hunt, 1983). Two osteomas have been reported in free-ranging white-tailed deer (Cosgrove et al., 1981).

The weight and bulk of the mass, its location on the head, as well as compression of the cerebral cortex was no doubt responsible for the progressive loss of weight of the deer. Bone neoplasms appear to be quite rare in cervids and they are of no consequence to deer populations.

Representative sections of the neoplasm

described in this report have been deposited in the Registry of Comparative Pathology (Armed Forces Institute of Pathology, Washington, D.C. 20306, USA; Accession Number 2174008-9).

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