Case Number: 24

Presenter & Institution: Susan Knowles DVM, PhD, DACVP; DOI/USGS/National Wildlife Health Center

Case History

Signalment:

Canada Goose (*Branta canadensis*)

Clinical History:

A sub-adult, female, wild Canada Goose was harvested by a hunter in Illinois in January, 2014. "Fatty tumors" were observed during field dressing and the goose was frozen and submitted to the National Wildlife Health Center for necropsy.

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Case Results

Histopathologic description:

Inguinal mass: Replacing myofibers and surrounding and individualizing remaining myofibers is a densely cellular, poorly demarcated, infiltrative, unencapsulated neoplasm. The neoplasm is composed of bundles and streams of closely packed cells, which occasionally form a herring bone pattern, supported by a fine fibrovascular stroma. Neoplastic cells are spindled with variably distinct cell borders, moderate eosinophilic, fibrillar cytoplasm with oval to elongate centrally located basophilic wavy nuclei with coarsely stippled chromatin and one or more small basophilic nucleoli. There is mild anisocytosis and anisokaryosis. Mitoses are 82 per 10 HPF's at 40x. There are multiple foci of necrosis and occasional collections of moderate numbers of lymphocytes and plasma cells. There is multifocal myofiber degeneration and necrosis. Many fascicles are empty and lined by flattened nuclei of the perimysium.

Morphologic diagnosis:

Inguinal mass: Multicentric malignant peripheral nerve sheath tumor (Neurofibrosarcoma, plexiform, diffuse)

Comments:

Neoplasms are infrequent in free-flying wild birds and peripheral nerve sheath tumors are rarely described in birds.[1] Musculoskeletal neurofibrosarcomas, lingual and subcutaneous neurofibromas, ocular, periocular and subcutaneous neurofibromas and endocardial neurofibromas have been described in Canada Geese, a green winged macaw, chickens, and a rosy-billed pochard, respectively.[1-5]

Peripheral nerve sheath tumors include the benign forms, schwannoma and neurofibroma, and the malignant forms, malignant schwannoma and neurofibrosarcoma. The cell of origin in these tumors is the Schwann cell. Histologic and ultrastructural features as well as immunohistochemistry are used to differentiate schwannomas from neurofibromas.[5] However, it is important to note that no distinct histologic criteria exist in the veterinary literature to classify schwannomas and neurofibromas.[4] In non-anaplastic areas, Schwannomas show two histologic patterns. Antoni A arrangements consist of uniform, fusiform cells in bands, herring bones, whorls or palisades (Verocay bodies). Antoni B tissue is loose and myxoid and may be hyalinized and sparse.[6] Nerve fibers are absent within the neoplasm but may be present at the margins of the tumor.[4] Neurofibromas are composed of elongated spindle cells with wavy nuclei and thin collagen fibers within the stroma.[5] Neurofibromas contain small nerve fibers.[7] Because it labels Schwann cells, S-100 immunoreactivity is diffuse and strong in Schwannomas, while it is patchy and limited to a subset of cells in neurofibromas.[5] Neurofibromas may have a subpopulation of CD-34 positive cells.[7] Ultrastructurally, schwannomas are composed entirely of Schwann cells,

whereas neurofibromas contain not only Schwann cells but also perineurial cells and fibroblasts. Schwannomas and neurofibromas can also be classified by their growth patterns localized (solitary, expansile, well circumscribed) or plexiform (multiple) or diffuse (infiltrative with no other features of malignancy) (neurofibroma only).[4]

In the current case, multiple, variably-sized, tan, irregular, soft, circumscribed masses measuring up to 9 cm x 8 cm were present within the pectoral, tibial and dorsal musculature, the right inguinal region, extending from the body wall, surrounding the colon and on the surface of the kidney. Histologic features were consistent with a malignant peripheral nerve sheath tumor (neurofibrosarcoma). There was moderate S-100 immunoreactivity in a sub-population of the neoplastic cells. All of the neoplastic cells were negative for desmin, indicating the neoplasm was not of muscle origin. Transmission electron microscopy was unrewarding due to post-mortem autolysis in the sections. Findings are consistent with those of Locke (1963) and Siegfried (1983) who diagnosed a "probable multicentric neurofibrosarcoma" and "fibrosarcomas, possibly of nerve-sheath origin" in Canada Geese.[1-2]

References:

1. Siegfried LM (1983) Neoplasms identified in free-flying birds. Avian Diseases 1:86-99
2. Locke LN (1963) Multicentric neurofibrosarcoma in a Canada Goose, *Branta canadensis*. Avian Diseases 7:196-202
3. Bossart GD (1983) Neurofibromas in a macaw (*Ara chloroptera*): Morphologic and immunocytochemical diagnosis. Vet Pathol 20:773-776
4. Schöniger S, Summers BA (2009) Localized, plexiform, diffuse and other variants of neurofibromas in 12 dogs, 2 horses, and a chicken. Vet Pathol 46:904-915
5. Miller AD, Baitchman EJ, Masek-Hammerman K (2012) Multiple endocardial neurofibromas in a rosy-billed pochard (*Netta peposaca*). JVDI 24:408-411
6. Maxie MG, Youssef S (2007) Nervous system. In: Maxie MG (ed) Jubb, Kennedy, and Palmer's Pathology of Domestic Animals 5th ed. Elsevier Limited, New York
7. Khodakaram-Tafti A, Khordadmehr M (2011) Multicentric fibromyxoid peripheral nerve sheath tumor (multicentric schwannoma) in a dromedary camel (*Camelus dromedarius*): morphopathological, immunohistochemical, and electron microscopic studies. Vet pathol 48:1180-1184