Case #6
Slide #: 16-2779-4

Institution: North Carolina State University

Signalment: 5-year-old, male, Red-Tailed Boa Constrictor

History: The snake presented to the NCSU Exotic Animal Medicine and Surgery Service for assessment of anorexia, weight loss, “mouth rot” and a coelomic mass that the owner noticed two weeks prior. His last meal was six month ago and he has progressively lost weight since then. An ultrasound was performed and revealed a large heterogeneous lobulated mass within the mid-coelomic cavity. A fine-needle aspirate of the mass revealed a mixed lymphoid population. A tru-cut biopsy revealed necrotic debris with granulation tissue. Further diagnostics at that time were declined. The patient was discharged and the client was instructed to continue monitoring him for changes in behavior, mentation, and energy level.
Approximately one month later, the animal was re-evaluated for continued weight lost and growth of the mass. A repeat ultrasound, revealed five new masses within the cranial and mid-coelomic cavity. A poor prognosis was given. Fifteen days later, the animal presented to the NCSU Emergency Service for euthanasia and was submitted for necropsy.

Gross findings: Multifocally within the esophagus and proximal stomach, there are 10 to 15, mucosally attached, soft to firm, tan masses that are individual, or grouped in clusters of 3 or 4, and begin at the proximal aspect of the esophagus, at the level of the heart, and end in the proximal portion of the stomach. Most masses are ulcerated and ovoid and have a viable base that is narrow, or wide occasionally, and have a luminal large cap of necrotic, laminated, tan white material, which sometimes makes-up 50% of the mass. Some smaller, mucosal, plaque-like masses were extensively ulcerated with a thick fibrinonecrotic membrane on the surface. Masses range in size from 2.5 x 1.2 x 1.0 to 11.0 x 5.5 x 3.5 cm. Adipose stores are absent and there is marked muscle wasting.

Histopathology:
Esophagus: Three sections are examined. Expanding the submucosa are multifocal, poorly to fairly well-demarcated, unencapsulated, densely cellular neoplasms composed of atypical neoplastic cells arranged in sheets supported by a minimal fibrovascular stroma. These cells have indistinct cell borders, a minimal to moderate amount of eosinophilic cytoplasm, and a round to reniform vesiculate nucleus with 1 – 2 prominent nucleoli. Occasionally multinucleation is observed. There is moderate anisocytosis and anisokaryosis. There are 78 mitotic figures observed in 10 high power (400x) fields. Along the periphery of the neoplasm and intermixed with neoplastic cells are low numbers of infiltrating granulocytes composed of macrophages admixed with fewer eosinophils and heterophils. Frequently scattered throughout the neoplasm are necrotic/apoptotic cells. In two of the three sections, the overlying mucosa is absent (ulcerated) and replaced by a thick serocellular crust composed of necrotic cellular and nuclear debris, eosinophilic hyalinized debris, and myriad mixed bacterial colonies. The underlying and adjacent intact tissue is infiltrated by moderate numbers of granulocytes, macrophages, and fewer lymphocytes. Throughout the mucosa, approximately 70 to 90% of mucosal epithelial cells contain one to multiple, eosinophilic, variably sized (3 – 7 um), intra-cytoplasmic, peri-nuclear inclusion bodies.

Morphologic Diagnosis:

1. Esophagus:
    a. Multifocal, round cell neoplasms with necrosis, ulceration, and mixed bacterial surface colonization
    b. Myriad, mucosal intracytoplasmic eosinophilic inclusion bodies

Discussion: The gross and histologic lesions in this snake are consistent with poorly differentiated round cell neoplasms. Immunohistochemical staining with ionized calcium-binding adapter molecule-1 (IBA-1) revealed a positive population of reactive macrophages admixed with high numbers of pleomorphic dendritic cells. The staining is largely complicated by the large population of reactive macrophages but histiocytic sarcoma is highly considered. Throughout the esophageal mucosa, as well as multiple organs including the liver, lung, and kidney, there are eosinophilic intracytoplasmic inclusion bodies consistent with Boid Inclusion Body Disease (BIBD).

BIBD is a world-wide, progressive, and fatal disease affecting captive boid species (boas and pythons). For decades, the causative agent was uncertain but speculated to be associated with a type C retrovirus. Unlike most inclusion bodies, BIBD inclusions are nonviral and composed exclusively of 68-kDa protein. Recently, a novel arenavirus has been isolated and identified as the proposed causative agent. Arenaviruses are enveloped, bisegmented negative-sense RNA viruses. In snakes, infection with BIBD causes intracytoplasmic inclusion bodies within epithelial cells throughout many organs and neurons within the brain and spinal cord.

Clinical signs differ between boas and pythons. Boas typically present with chronic regurgitation, anorexia, and weight loss that slowly progresses to neurologic signs including head tremors, opisthotonus, incoordination, and paresis as the disease progresses. In contrast, pythons typically do not exhibit regurgitation and develop rapid progression of neurologic signs with an earlier on-set of death. Snakes frequently succumb to secondary septicemic infections or neoplastic processes. In this case, the snake was euthanized due to poor prognosis after identification of multiple neoplasms throughout the gastrointestinal tract. The disease is considered contagious due to the rapid spread of clinical signs within populations; however a definitive mode of transmission has not been established. The snake mite (*Ophionysssu natricis)* is suspected to be associated with transmission due to the high occurrence rates in snakes concurrently experiencing BIBD outbreaks. An ante-mortem diagnosis is obtained by histologic examination of a biopsy specimen for the presence of inclusion bodies. Peripheral blood smears can also be diagnostic; however, not all snakes have inclusion bodies within circulating blood cells. Quarantine of new boids for a minimum of 3 months is recommended to prevent introduction of the disease.

References

1. Chang, Li-Wen, and Elliott R. Jacobson. "Inclusion body disease, a worldwide infectious disease of boid snakes: a review." *Journal of Exotic Pet Medicine* 19.3 (2010): 216-225.
2. Hetzel, Udo, et al. "Isolation, identification, and characterization of novel arenaviruses, the etiological agents of boid inclusion body disease." *Journal of virology* 87.20 (2013): 10918-10935.
3. Schumacher, Juergen, et al. "Inclusion body disease in boid snakes." *Journal of Zoo and Wildlife Medicine* (1994): 511-524.

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