AUBURN UNIVERSITY
COLLEGE OF VETERINARY MEDICINE

Case #: P24-002091

Presenter and co-Authors: Jessica Lambert*, DVM; Maninder Sandey, DVM, MVSc, PHD, DACVP.

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Signalment: 15-year-old, spayed female, Golden Retriever mix dog.

History: The patient was referred to a specialty hospital for further evaluation following a 1-week history of fever, profound lethargy, and restlessness. During the initial physical examination, the patient was noted to have a distended abdomen. Abdominal radiographs revealed a large mass associated with the liver. Subsequent ultrasound examination showed a small hypoechoic nodule within the parenchyma of the right kidney and a large (approximately 10 cm) heteroechoic cavitated mass in the left liver lobe. The patient was referred to the specialty hospital one month later after brief hospitalization at an emergency facility for suspect rupture of the mass. A complete blood count showed a mild anemia (34%) along with a moderate leukocytosis (45.27 K/uL; RI: 5.05 -16.76 K/uL) characterized by a moderate neutrophilia (39.42 K/uL; RI: 2.95 – 11.64 K/uL) and mild monocytosis (3.19 K/uL; RI: 0.16 – 1.12 k/UL). A chemistry panel showed a moderately increased ALP (1,731 U/L; RI: 23 – 212 U/L) and a mild hyperglobulinemia (4.7 g/dL; RI: 2.5 – 4.5 g/dL). A ventral midline celiotomy was performed and revealed a large, lobulated irregular mass arising from the left medial liver lobe. The mass could not be isolated from the quadrate lobe of the liver. Ligature was applied near the hilus to both the quadrate and medial lobes, followed by a liver lobectomy of the left medial lobe to facilitate mass removal.

Gross findings: The left medial lobe and associated mass measured 15 x 15 x 7.5 cm. The mass was tan to dark brown, multilobulated, cavitated to solid, and leaked a moderate amount of tan opaque fluid when sectioned.

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Signalment: 15-year-old, spayed female, Golden Retriever mix dog.

Histopathology: Mass, left medial liver lobe: Two distinct neoplastic populations are evident in the observed sections. Expanding and effacing the liver is an unencapsulated, infiltrative, densely cellular neoplasm composed of polygonal cells arranged in irregular cords and trabeculae supported by a moderate amount of fibrovascular stroma. Neoplastic cells are strongly reminiscent of hepatocytes, with variably distinct cell borders, abundant finely granular, variably vacuolated (glycogen-type), eosinophilic cytoplasm, and round to oval nuclei with finely stippled chromatin and 1-3 prominent nucleoli. Anisocytosis and anisokaryosis are moderate with occasional binucleated cells. There is <1 mitotic figure in ten standardized 400x fields (2.37mm2). Multifocally within and adjacent to the neoplasm, large areas of coagulative necrosis are observed along with granulation tissues and inflammatory infiltrates composed of large numbers of neutrophils and hemosiderin- or hematoidin-laden macrophages with moderate numbers of lymphocytes, plasma cells. Multifocally, tumor lobules are separated by thick, branching bands of fibrocollagenous stroma that contain large numbers of hemosiderophages, and other inflammatory cells. Within the mass are large areas of hemorrhage associated with moderate numbers of erythrophagocytic, hemosiderin-containing macrophages. Scattered rarely throughout the parenchyma of some sections are small clusters of lipid and golden-brown pigment laden macrophages with fewer lymphocytes (pigment lipogranulomas).

Multifocally within the neoplasm, a second population of neoplastic cells is observed. These neoplastic cells are either individualized, form nests or islands and embedded in an edematous, fibrocollagenous stroma. These neoplastic cells have indistinct cell margins, a moderate amount of granular eosinophilic cytoplasm, round to oval nuclei with finely stippled chromatin, and 1-2 prominent magenta nucleoli. Anisocytosis and anisokaryosis are moderate. There are 4 mitotic figures in ten standardized 400x fields (2.37mm2). Multifocally, neoplastic cells exhibit squamous differentiation. Neoplastic cells occasionally contain large, clear cytoplasmic vacuoles that peripheralize the nucleus (Melamed-Wolinska bodies). Neoplastic cells multifocally have strong immunoreactivity for Uroplakin III antigen.

Morphologic diagnosis and etiology: Mass, left medial liver lobe:
1. Hepatocellular carcinoma
2. Presumed metastatic urothelial cell carcinoma

Ancillary testing: Uroplakin III antigen

Comments: Histologic findings in the observed sections are consistent with a primary hepatocellular carcinoma and a secondary metastasis from a presumed urothelial cell carcinoma. The second population of neoplastic cells multifocally have strong immunoreactivity for Uroplakin III antigen, which is widely recognized

as a highly specific marker for urothelial or transitional cell carcinoma (UCC or TCC). In a study involving 102 dogs with transitional cell carcinoma, it was found that nodal and distant metastasis is reported in 16% and 14% of dogs at the time of diagnosis, respectively. Moreover, more than half of dogs with TCC have distant metastases at the time of death. In another study involving 137 dogs undergoing necropsy, distant metastases were documented in 58% of dogs. These metastases occurred to various sites including the lungs, bones, liver, kidney, adrenal gland, skin, spleen, gastrointestinal tract, heart, and brain.

References:

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2. Knapp DW, Ramos-Vara JA, Moore GE, Dhawan D, Bonney PL, Young KE. Urinary bladder cancer in dogs, a naturally occurring model for cancer biology and drug development. ILAR J. 2014;55(1):100-18.