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Case number: 24-13324

Presenter: Ian K. Hawkins

Collaborators: Varvara Semenova, Ashton Berger, Josep Aisa, Judith Bertran, Chanel Shum, Christopher J. Lanier.

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Signalment: 14-year-old, female spayed golden retriever dog

History: The patient presented for removal of a soft tissue mass on the left rostral maxillary lip. The mass had grown progressively over two months. In the weeks prior to surgery the overlying skin became reddened and began to irritate the patient, leading to localized self-trauma. Cytology of the mass raised concerns for a mast cell tumor with a pronounced fibroblastic response, a primary sarcoma with secondary mast cell infiltrates, or possibly two concurrent neoplasms (e.g. “collision tumor”). The lip mass was narrowly resected and the left mandibular lymph nodes were removed; both samples were submitted for histopathology.

Gross findings: Submitted for histopathology was a ~7 x 6 x 1.5 cm sample of haired skin from the lip region with a poorly defined 1.3 x 0.9 x 0.3 cm thickened region near the junction of the lip mucosa. Additionally submitted were two samples of left mandibular lymph node measuring 2.5 x 1.5 x 0.5 cm and 1.5 x 1.0 x 0.5 cm. Representative sections of the lip and left mandibular lymph node samples were sectioned and processed for histologic examination.

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Histopathology: Lip: Filling the majority of the dermis, involving the submucosa, and disrupting the skeletal muscle was a poorly demarcated, unencapsulated, infiltrative, densely cellular neoplastic population. The neoplastic cells were spindled and arranged in interlacing spindles and bundles separated by a mild to moderate, collagenous matrix. The neoplastic cells had indistinct cell borders and moderate amounts of fibrillar light eosinophilic cytoplasm. Nuclei were oval to elongate with fine-stippled to vesicular chromatin and 1-2 prominent, central nucleoli. Anisocytosis and anisokaryosis were moderate. Mitoses were 23 mitotic figures in 2.37 mm^2. The neoplasm contained occasional foci of hemorrhage and necrosis that represented up to 10-15% of neoplasm area. Multifocally dispersed throughout the neoplastic spindle cell population was a separate, moderate density population of large, mastocytic round cells arranged in thin cords, aggregates, and often individualized. These cells had distinct borders and had moderate amounts of pale amphophilic cytoplasm that contained moderate numbers of fine, basophilic, metachromatic granules (highlighted via Giemsa stain). The nuclei were round to oval with finely-stippled chromatin and indistinct nucleoli. Anisocytosis and anisokaryosis are mild to moderate. Mitoses amongst these round cells were 2 mitotic figures in 2.37 mm^2 (equivalent to ten FN22/40x objective fields). No multinucleated giant cells were observed in 2.37 mm^2. Often interspersed with the round cells were low to moderate numbers of eosinophils with fewer plasma cells, lymphocytes, and pigment-laden macrophages. The overlying epidermis ranged from ulcerated to moderately hyperplastic; ulcerated areas were overlaid with variably thick fibrino-neutrophilic mats.

Left mandibular lymph node (not included in the slide): Lymphoid follicles were moderately hyperplastic. Medullary sinuses contained low to moderate numbers of macrophages, hemosiderin-laden macrophages, and fewer scattered melano-macrophages. Giemsa stain highlighted scant to low numbers individualized, well differentiated mast cells; typically, 0-3 mast cells per 40x objective field. In a few areas, the medullary areas contained low numbers of loosely aggregated, non-cohesive mast cells with numbers reaching 10-20 mast cells per 40x objective field. No mass-forming units of neoplastic spindle cells, nor mass-forming units of the mastocytic round cells were observed in these examined sections.

Morphologic diagnoses:

1. Soft tissue sarcoma, high grade, skin, left maxillary lip.
2. Mast cell tumor, low grade (two-tier grading system), skin left maxillary lip.

Immunohistochemistry: The majority of the neoplastic round cell population exhibited moderate membranous to cytoplasmic immunopositivity for CD117. The neoplastic spindle cell population was diffusely immunonegative for CD117. Both neoplastic populations were diffusely immunonegative for PNL-2.

Comments: The majority of the mass-effect in the lip sample was due to a soft tissue sarcoma; the cell differentiation level, elevated mitotic count, and presence of tumor necrosis put it into the high grade category[1]. These neoplastic spindled cells correlated with the spindle cell population noted on cytology. In addition, intermixed with this soft tissue sarcoma were numerous large, mildly atypical mast cells consistent with a concurrent mast cell tumor in the region and explaining the high mast cell numbers seen on cytology. The lower mitotic count, nuclear atypia level, and lack of multinucleated mast cells warranted the low grading according to the two-tier cutaneous mast cell tumor grading system[2]. The heavily intermingled appearance of the spindle cell population and mastocytic population would be indicative of a "composite" or "biphenotypic tumor[3]." And of note, this neoplasm combination (i.e. soft tissue sarcoma plus mast cell tumor) was overrepresented in one study of canine mixed tumors[3]. A reactive process was carefully considered for the mast cell population (i.e. a secondary mastocytic inflammatory infiltrate) and still remains a possibility, however their overall higher cell density across the sections and increased cell/nuclear atypia favored the diagnosis of mast cell neoplasia.

The submitted lymph node did not contain mass-forming units of neoplastic spindled cells, nor mass-forming units of neoplastic mast cells, suggesting that it was metastasis free for both neoplasms. The lymph node did contain a few loose, non-cohesive aggregates of mast cells which were interpreted as draining reactive mast cells. However, these mast cell numbers would be classified as a pre-metastatic (HN1) lesion according to the Weishaar et al mast cell tumor metastasis classification system[4].

References:

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4. Weishaar KM, Thamm DH, Worley DR, Kamstock DA. Correlation of Nodal Mast Cells with Clinical Outcome in Dogs with Mast Cell Tumour and a Proposed Classification System for the Evaluation of Node Metastasis. Journal of Comparative Pathology. 2014; 151: 329-338.