Diagnostic Exercise

From The Davis-Thompson Foundation*

Case # **241**; Month: **July**; Year: **2024**

Answer Sheet

Title: Hemopericardium with right auricular hemangiosarcoma and left auricular chemodectoma in a dog.

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Clinical history: An 11-year-old spayed female Golden Retriever dog was evaluated because of progressive lethargy and shallow breathing. An echocardiogram revealed a mass attached to the right auricle, and the patient was euthanized.

Autopsy findings: The pericardial sac contained 200 ml of blood. The right auricle was expanded by a 2.5 × 1.2 × 1.3 cm, dark red, firm nodule covered with fibrin and blood clots (Fig. 1). The cut surface was dark red. The left auricle and part of the aorta were expanded by a 1.4 × 1.7 × 1.2 cm, pale pink, firm, smooth nodule (Fig. 2). The cut surface was white.

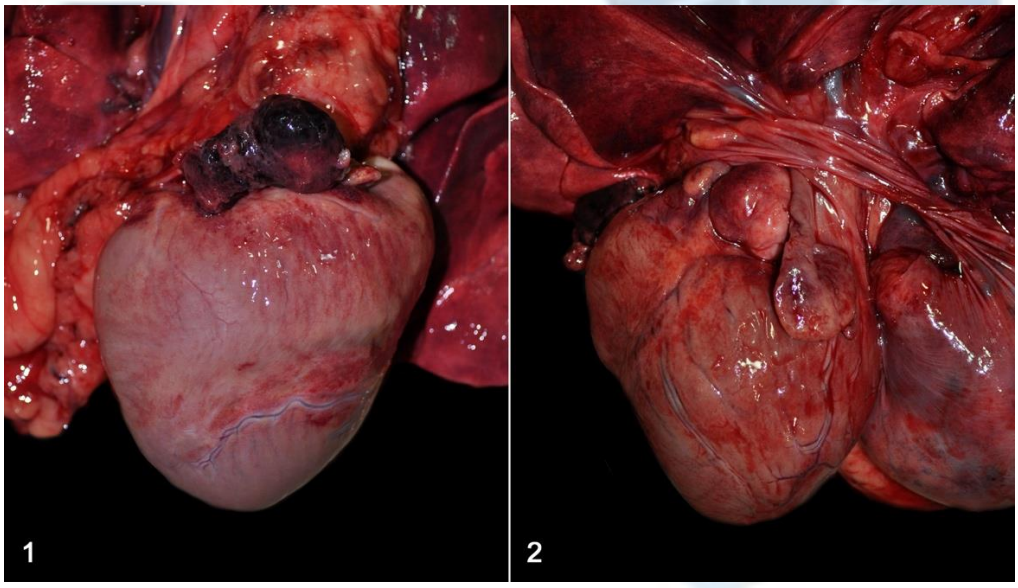

Figure 1. Heart, dog. The right auricle is expanded by a red nodule covered with fibrin and blood clots. **Figure 2.** Heart, dog. The left auricle is expanded by a pale pink, smooth nodule.

Gross differential diagnoses for the right auricular lesion: Hemangiosarcoma.

Gross differential diagnoses for the left auricular lesion: Chemodectoma, ectopic thyroid adenoma or carcinoma, lymphoma.

Histologic findings: The right auricular tissue was expanded and effaced by a poorly demarcated endothelial neoplasm with extensive hemorrhage (Fig. 3). Neoplastic cells were arranged in solid sheets or lined small vascular spaces filled with blood and supported by collagen bundles. Neoplastic cells were polygonal to elongate and had a moderate amount of eosinophilic cytoplasm. Nuclei were oval and irregular, often cleaved, and had finely stippled chromatin with 1–2 nucleoli. There were 10 mitoses in 2.37 mm^2 (10 FN22/40X fields). The neoplasm extended to the epicardial surface, which was covered with fibrin strands, hemorrhage, and swollen, reactive mesothelial cells.

The left auricular tissue was expanded and effaced by a well demarcated neoplasm with moderate to advanced postmortem autolysis (Fig. 4). Neoplastic cells were arranged in nests or packets separated by a fine fibrovascular stroma. Neoplastic cells were polygonal to cuboidal and had a moderate amount of eosinophilic, finely vacuolated cytoplasm. Nuclei were round and had finely stippled chromatin with 1–3 small nucleoli. There was low cell and nuclear atypia. No mitoses were observed in 2.37 mm^2. Clusters of neoplastic cells were present in the lumen of blood vessels.

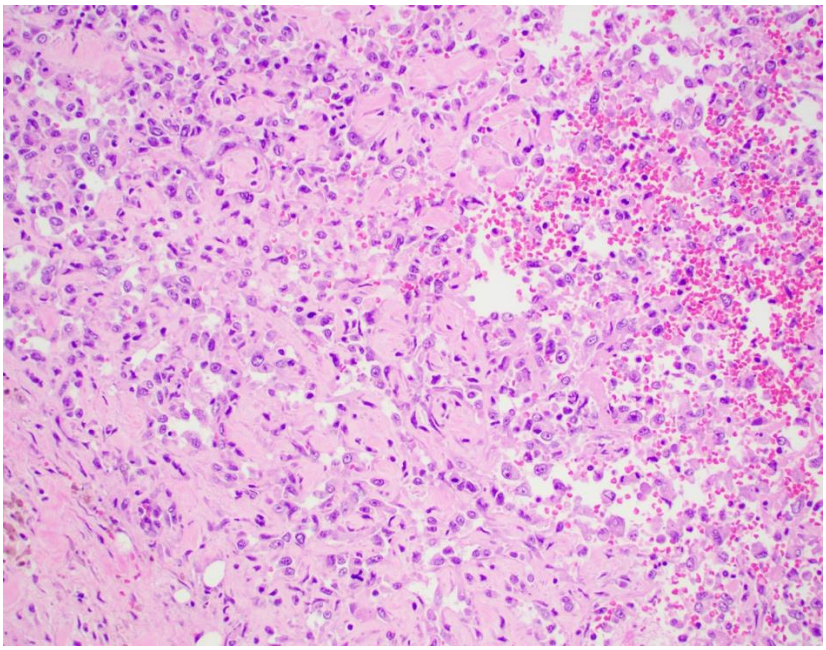

Figure 3. Heart, dog. The right auricle. Neoplastic cells are arranged in solid areas (left) or line small vascular spaces filled with blood (right).

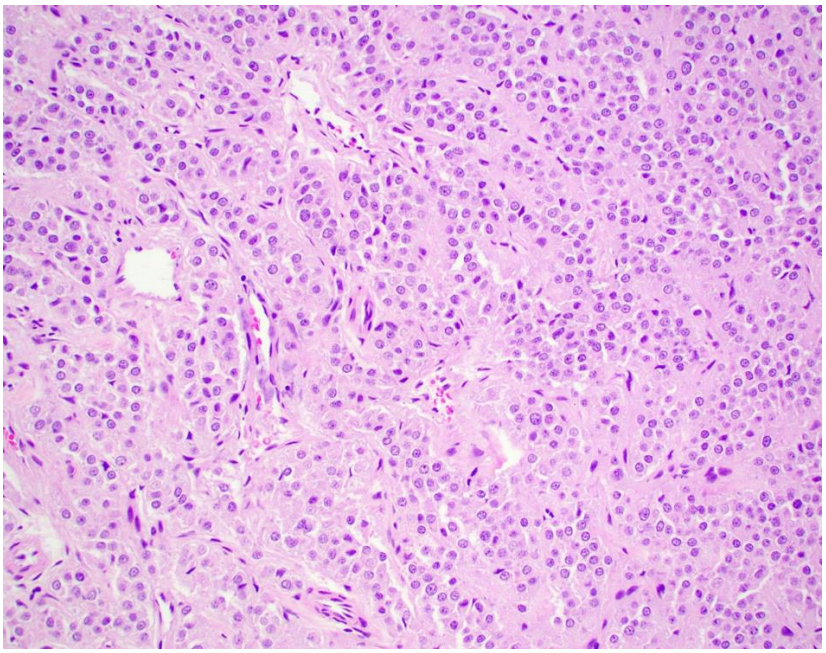

Figure 4. Heart, dog. The left auricle. Neoplastic cells arranged in nests and packets separated by a fine fibrovascular stroma.

Morphologic diagnosis: Hemopericardium (gross diagnosis) with right auricular hemangiosarcomas and left auricular chemodectoma.

Diagnostic confirmation and differential diagnoses: Routine histology typically suffices for a diagnosis, but immunohistochemistry may be necessary. Neoplastic endothelial cells in hemangiosarcomas have cytoplasmic immunolabeling for factor VIII-related antigen (FVIIIRA) and membranous immunolabeling for CD31; neoplastic cells in chemodectomas have inconsistent cytoplasmic immunolabeling for synaptophysin, chromogranin-A, S-100, and neuron specific enolase.

Ectopic thyroid neoplasms can be confirmed by the presence of immunolabeling for thyroglobulin and thyroid transcription factor 1. Lymphoma can be confirmed by the positive immunolabeling for T and B lymphocytic markers such as CD3 and CD79, CD20, or CD21, respectively.

Comments: Pathology findings in our case were consistent with hemopericardium secondary to a right auricular hemangiosarcoma. In addition, the patient also had a left auricular chemodectoma. These are the two most common heart base neoplasms of dogs with hemangiosarcomas occurring in the right auricle and chemodectomas in the left auricle and vicinities of the aorta (1–4). Their mutual occurrence (as seen in our case) is exceedingly rare.

Hemangiosarcoma arises from endothelial cells and can be found in a wide variety of tissues (2). Tumors can be localized or multiple. In dogs, hemangiosarcomas typically affect adult to old individuals and occur in the skin or internal organs such as lungs, spleen, liver, and heart, among others (2). In the heart, tumors often arise from the right auricle as solitary tumors (as in our case) or as part of disseminated disease (2). Cardiac hemangiosarcomas can lead to clinical signs of heart insufficiency or cause sudden death due to cardiac decompensation and/or acute hemopericardium (2). The clinical significance of the hemopericardium remained undetermined in our case as the patient was euthanized. However, it likely contributed to the reported clinical signs. The histologic diagnosis of a hemangiosarcoma is usually straightforward, but IHC for endothelial markers (FVIIIRA and CD31) may be needed in cases in which an atypical morphology is present, such as in cases of epithelioid hemangiosarcomas (1).

Chemodectoma arises from extra-adrenal paraganglia (chemoreceptor) cells located in the aortic or carotid body and other sites in the head and neck, mediastinum, and abdomen (3,4). Chemoreceptor cells regulate blood pressure, heart rate, and respiration in response to changes in blood chemistry, particularly oxygen and carbon dioxide levels (4). Tumors affect mainly adult to old patients. Brachycephalic dogs such as Boxers and Boston Terriers are predisposed to develop chemodectomas (4). Human chemodectomas located in the thorax, abdomen, and pelvis can lead to clinical signs related to the release of norepinephrine, while chemodectomas arising in the head and neck are typically biochemically silent (3). The endocrine activity of chemodectoma in dogs has not been confirmed, and tumors lead to clinical signs associated mainly with the space-occupying or locally infiltrative nature of the tumor, including dyspnea, coughing, dysphagia, intolerance to exercise (3), and other clinical signs or pathologic changes associated with chronic cardiac insufficiency (cyanosis, subcutaneous edema, hydrothorax, hydropericardium, ascites, and chronic passive congestion of the liver) (4).

The presence of multiple packets of neoplastic cells separated by a scant fibrovascular stroma should be highly suggestive of a chemodectoma (4,5). However, histologic distinction between a benign and a malignant chemodectoma may be difficult and relies on the presence of local invasion, vascular invasion (as observed in our case), and/or metastases (4). As observed in our dog, tumors rapidly undergo postmortem autolysis. Although IHC for synaptophysin, chromogranin-A, S-100, and neuron specific enolase may be needed to support the diagnosis in more challenging cases, immunolabeling may be inconsistent and unreliable.

References

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