Hepatocellular adenoma in a 12-year-old crossbred German shepherd dog

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Abstract — A 12-year-old, neutered male crossbred German shepherd presented with lethargy, inappetence, vomiting, and diarrhea. Bile duct carcinoma was diagnosed by cytological analysis of samples obtained by ultrasound-guided fine-needle aspiration. After surgical excision of the mass, the histologic diagnosis was hepatocellular adenoma.

Résumé — Adénome hépatocellulaire chez un chien berger allemand de race croisée âgé de 12 ans. Un berger allemand de race croisée, mâle castré âgé de 12 ans, a été présenté pour léthargie, inappétence, vomissement et diarrhée. Un carcinome du canal biliaire a été diagnostiqué par analyse cytologique d'échantillons obtenus par aspiration à l'aiguille fine guidée par ultrasons. Après excision chirurgicale de la masse, un diagnostic histologique d'adénome hépatocellulaire a été posé.

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A 12-year-old, 25-kg, neutered male crossbred German shepherd was presented (day 1) with a history of diarrhea for 2 wk. The owners described weakness, lethargy, inappetance, vomiting after eating grass, and tenesmus. The dog was well known to the veterinarian, current in terms of prophylactic vaccinations, and without prior medical problems. Findings on physical examination were normal, except for a slightly elevated rectal temperature (39.9°C) and marked splinting, suggestive of pain, on cranial abdominal palpation.

The only abnormalities noted on in-clinic hematological and serum biochemical profiles were markedly elevated alanine aminotransferase (> 7000 U/L; reference range, 10 to 100 U/L) and alkaline phosphatase (1317 U/L; reference range, 23 to 212 U/L). The dog was discharged to be treated with metronidazole (Apo-metronidazole; Apotex, Toronto, Ontario), 20 mg/kg bodyweight (BW), PO, q24h for 5 d, and amoxicillin (Novo-amoxin; Novopharm, Toronto, Ontario), 20 mg/kg BW, PO, q12h for 14 d. Further diagnostic testing, including abdominal radiographs and ultrasonography, were planned for the following day.

On day 2, lateral and ventrodorsal plain abdominal radiographs showed increased opacity in the right cranial abdominal area. The areas of the chest and lungs that could be evaluated on the radiographs appeared normal. The owners agreed to a referral for ultrasonography. Since a coagulation profile was not available, vitamin K1 (Phytonadione; Vetoquinol, Joliette, Quebec), 5 mg/kg BW, SC, was administered, and abdominal ultrasonography was scheduled for day 7.

Ultrasonography revealed a mass 7 to 8 cm in diameter in the right cranial abdomen. The mass, which appeared to contain numerous foci of necrosis or intraparenchymal hemorrhage, was located close to the spleen and the right middle liver lobe and did not appear to involve mesenteric lymph nodes, kidneys, or bladder. Under local lidocaine anesthesia (Lidocaine HCl 2%; Ayerst, Guelph, Ontario), multiple ultrasound-guided fine-needle aspirates of sanguineous fluid were obtained from the mass. Smears of the aspirates were stained with Wright's stain and submitted for cytological analysis (Vita-Tech Laboratory Services, Markham, Ontario).

Differential diagnoses included benign or malignant primary hepatic or intestinal neoplasm, hepatic abscess, splenic mass, or secondary hepatic neoplasm. The cytopathological diagnosis was epithelial neoplasia compatible with bile duct carcinoma. The pathologist noted the difficulty in differentiating benign from malignant cholangiolar neoplasms solely on the basis of cytopathological criteria. It was suggested that if the mass was solitary, surgical resection should be considered. The owners opted for an exploratory laparotomy to determine the exact nature of the mass and to have it surgically excised, if possible.

On day 9, the dog was readmitted for lateral and ventrodorsal chest radiographs, which showed no evidence of pulmonary metastases. Accordingly, sodium chloride solution (0.9% Sodium Chloride Injection USP; Baxter, Toronto, Ontario) was administered at a rate of 20 mL/kg

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BW/h, IV. Also administered were cefazolin (Cefazolin Sodium; Novopharm), 20 mg/kg BW, IV, and vitamin K1 (Phytonadione; Vetoquinol), 5 mg/kg BW, SC.

Exploration of the cranial abdomen through a ventral midline incision revealed a solitary, 8-cm mass attached to the caudal aspect of the right middle liver lobe. No other liver lobes were involved and the gall bladder could be expressed easily. There were no other abnormal intraabdominal findings. To remove the mass, adjacent normal hepatic parenchyma was carefully crushed by using the finger fracture technique, and visible vessels and ducts were ligated. Then, by using the guillotine technique and 0 PDS suture material, the abnormal portion of the lobe was removed with minimal hemorrhage. An omental wrap was placed around the remaining portion of the lobe and the abdominal wall was closed routinely by using 3 layers. The dog remained stable throughout surgery, and its recovery from anesthesia was uneventful.

On gross inspection, the mass was greenish-yellow and reddish-brown, appeared well encapsulated, and contained numerous apparently necrotic foci, 1 to 2 cm in diameter. Multiple sections from the mass were collected in 10% buffered formalin and submitted for histological analysis (Histovet Surgical Pathology, Guelph, Ontario).

One day postoperatively, the incision showed no evidence of infection, vital signs were normal, and the dog was treated with ampicillin (Ampicillin Sodium; Novopharm), 20 mg/kg BW, SC. Cefazolin, 20 mg/kg BW, and morphine (Morphine Sulfate; Sabex, Boucherville, Quebec), 0.25 mg/kg BW, were also given, SC. The dog was released on day 11 to be treated with enrofloxacin (Baytril; Bayer, Toronto, Ontario), 6 mg/kg BW, PO, q24h for 5 d, and metronidazole, 20 mg/kg BW, PO, q12h for 5 d. At reexamination on day 15, the owner reported that the dog was doing very well. Enrofloxacin therapy was continued for a further 7 d.

The histological diagnosis of the mass was hepatocellular adenoma with extensive infarction and fibrosis. The owner reported no further problems on day 26, when the abdominal sutures were removed, and on day 43.

Primary hepatic neoplasms are rarely seen in dogs, accounting for only 0.6% to 1.3% of all canine neoplasms (1). Liver neoplasms tend to occur in older animals, with an average age of 10 to 12 y (2). No breed predispositions have been reported and conflicting information exists about sex predisposition (2). No firm etiopathogenesis for hepatic neoplasia has been established in dogs and cats (2); however, tumors have been experimentally induced in dogs exposed to various forms of radiation and various chemicals (2). Because of the important role of the liver in detoxification, the hepatobiliary system may be especially susceptible to the effects of mutagenic compounds (2). Although no viral causes of hepatic neoplasia have been found in dogs, liver flukes have been reported as a cause (3).

Hepatocellular adenomas are benign, single, large, pedunculated tumors of epithelial origin that are clearly demarcated and well differentiated from adjacent normal liver (4). Dogs with primary hepatic neoplasia often present with nonspecific signs, such as anorexia, lethargy, vomiting, diarrhea, polyuria, polydipsia, abdominal pain, and abdominal distension (5,6), some of which were seen in this case. The most common physical finding is hepatomegaly (2). Changes in biochemical and hematological parameters are frequently present, but they are nonspecific, as they do not differentiate between neoplastic, inflammatory, and degenerative processes (5). As in this case, the most common radiographic appearance of a primary liver tumor is that of an asymmetric cranial abdominal mass (3). Ultrasonography offers a more precise method of detecting the site of origin of an abdominal mass and may be used as a guide to obtain fine-needle aspirates, as in this case, or for preoperative liver biopsy. Although biochemical albumin and urea levels were normal in this dog, indicating adequate liver function, clotting parameters had not been evaluated, and the radiologist elected not to perform a hepatic core biopsy, avoiding the risk of biopsy-associated hemorrhage.

Many differential diagnoses were considered in this case. In order to determine a definitive diagnosis and to establish a prognosis, pathologic evaluation of liver tissue was required. Both cytological and histological methods of evaluation have advantages and disadvantages, and each is dependent on the interpretive skills of the pathologist and the quality of the history and tissue submitted (7). The primary advantages of cytological examination of fine-needle aspirates include reduced cost, ease of obtaining the specimen, minimal sedation required, and a lesser degree of invasiveness (7,8). The major disadvantages are small sample size and the difficulty in sampling focal hepatic lesions (8). In addition, cells may be disrupted during the preparation of a smear for cytologic examination, causing loss of the relationship between detached cells, cell clusters, and tissue fragments, which may be an important source of information (7). Combining fine-needle aspiration with ultrasonography significantly increases the likelihood of sampling focal lesions, and this combination has greatly enhanced the diagnostic sensitivity and specificity of hepatic fine-needle aspirates (8). Nevertheless, in this case, the cytopathological diagnosis made by using ultrasound-guided fine-needle aspiration was different from the histological diagnosis.

Histologic examination allows for inspection of surgical margins for remnant disease and invasion of lymphatic channels, blood vessels, and associated tissue structures (7). Histopathologic examination is far superior to cytologic examination in assessing the structural and architectural relationships of a tissue and, in most situations, the histopathologic finding is the standard with which a cytologic finding is compared (7).

A study completed at the Angell Memorial Animal Hospital, Boston, Massachusetts, reviewed the results of liver cytologic findings and corresponding histopathologic findings on biopsy specimens, with the objective of assessing the value of fine-needle aspirate cytologic examination in diagnosing liver disease (9). Ultrasonography was not used to guide fine-needle aspiration. The study found that cytological results differed from histologic observations in 20% of the 56 cases and, in 3 of 11 cases, the additional histologic diagnosis of inflammation was clinically sufficiently important to affect the choice of treatment (9). Additional histological analysis in this dog provided a quite different prognosis

than was given initially after cytological analysis. Furthermore, histological analysis allowed for more informed decisions to be made regarding treatment. Results of studies by Kristensen et al (8) suggest that a correct diagnosis is not consistently established by fine-needle aspiration in nondiffuse hepatic disease. The inaccurate cytopathological findings in this case might have been the result of poor cellularity of aspirate smears or sampling of areas that contained few cells.

Surgical resection is the principal treatment for hepatocellular adenoma (1,2). Surprisingly, tumor size is not a reliable prognostic indicator, and dogs with large solitary liver tumors usually have a good prognosis after surgery (1,3,6). Up to 75% of the liver may be resected in the dog with little or no detectable alteration in hepatic function (1). The significance of a diagnosis of hepatocellular adenoma in this case suggests that the surgical excision performed should be curative.

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