Diagnosis of Rare Case of Hepatoblastoma in a Dog

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Abstract: A 9-year-old, intact female Shiht-zu dog presented with a three-week history of anorexia, lethargy, and weight loss. Abdominal radiography revealed a mass in the right cranial quadrant of the abdomen that was displacing the right kidney caudally. Ultrasonography showed a large, irregular, heterogeneous hepatic mass and a small amount of peritoneal fluid. On computed tomography (CT), a large hypoattenuating mass with heterogeneous contrast enhancement occupied the right lateral lobe, and parts of the right medial and caudate lobes of the liver. There was no evidence of regional lymph node or pulmonary metastasis. Lobectomy of the right medial, right lateral and caudate liver lobes was performed, however, the patient did not recover from surgery. Hepatoblastoma was confirmed by histological examination. Hepatoblastoma is rare in dogs, and this is the first report describing CT imaging of hepatoblastoma in a dog.

Key words: computed tomography, dog, hepatic tumor, hepatoblastoma, liver.

Introduction

Primary hepatic tumors are uncommon in dogs and account for 0.6-0.9% of all canine tumors (4,6). The most common primary hepatic tumors are hepatocellular carcinomas, hepatocellular adenomas, and bile duct carcinomas (10). Less common primary tumors include fibromas, fibrosarcomas, hemangiomas, hemangiosarcomas, leiomyosarcomas, and osteosarcomas (10). Hepatoblastoma has been reported previously in only one dog (12). The clinical signs of canine hepatic tumors are nonspecific; they include anorexia, lethargy, vomiting, and diarrhea (6). The most common finding on physical examination is hepatomegaly or a mass in the cranial abdomen (6). Although the diagnosis is confirmed by histopathological examination, diagnostic imaging, such as radiography, ultrasonography, and computed tomography (CT) is helpful for diagnosis. This study described the diagnostic imaging, including CT, of a rare case of hepatoblastoma in a dog.

Case Report

A 9-year-old, intact female, Shih-tzu was presented with a three-week history of anorexia, lethargy, and weight loss from 4.10 to 3.45 kg. On physical examination, the dog showed mild icterus, pale mucous membranes, and body condition score 3 of 9 point scale. A complete blood cell count revealed decreased numbers of red blood cells (2.81 M/µL; reference interval (RI), 5.50-8.20 M/µL), hemoglobin (6.72 g/dL; RI, 12.6-19.4 g/dL), and hematocrit (19.9%; RI, 36.9-55.0%). Serum chemistry findings were of increased levels of alkaline phosphatase (349 U/L; RI, 17-78 U/L), aspartate transferase (484 U/L; RI, 17-44 U/L), and gamma glutamyl transpeptidase (88 U/L; RI, 5-14 U/L). Coagulation tests revealed normal activated partial thromboplastin time (83 s; RI, 72-102 s), prothrombine time (13 s; RI, 11-17 s), and D-dimer (211 mg/dL; RI, 50-250 mg/dL).

Abdominal radiography depicted soft-tissue opacity; a large mass in the right cranial quadrant of the abdomen that was displacing the right kidney caudally and had decreased serosal detail (Fig 1). Thoracic radiography demonstrated no significant findings. On abdominal ultrasonography, a large, irregular, and heterogeneous mass in the right hepatic lobe was visible. In addition, a small amount of peritoneal fluid was detected.

A CT examination was performed with a 32-multislice CT system (Alexion™, Canon Medical Systems, Tokyo, Japan). The patient was positioned in sternal recumbency on the CT table without anesthesia. The scanning parameters were as follows: 120 kV, 150 mA, 1.0 mm slice thickness, and 0.75 s rotation times. A contrast study was conducted after intravenous administration of 600 mgI/kg of iohexol (Bonorex 300, DaiHan Pharm. Co., Ltd., Seoul, Korea) via autoinjector for 20 s. Postcontrast CT images of the arterial, portal-venous, and delayed phases were obtained 20, 35, and 90 s after injection, respectively. A large (72.1 × 82.9 × 90.6 mm), hypoattenuating mass with well-defined margins was identified in the right lateral, right medial, and caudate lobes (Fig 2). The mass remained hypoattenuating in comparison with normal liver tissue; enhancement was heterogeneous throughout all postcontrast phases of imaging. The mass compressed and displaced the caudal vena cava without invasion. There was no evidence of the pulmonary and regional lymph node metastasis. In addition, there were no significant findings of pulmonary thromboembolism secondary to large hepatic tumors on physical examination, coagulation tests, radiography, and CT examination. On the basis of radiographic, ultrasono-
graphic, and CT findings, primary hepatic tumor was at the top of the differential diagnosis.

Fine needle aspiration was performed preoperatively, and the sample was diagnosed as hepatocellular carcinoma with differential diagnosis of hepatoblastoma. Although the hepatic mass was large, it was considered as a primary hepatic tumor without invasion and metastasis to the surrounding organs, so surgical removal of the tumor was considered. The surgery was performed at the strong request of the client. Blood transfusion and fluid therapy were performed preoperatively to decrease anesthetic and surgical risks. Lobectomy of the right medial, right lateral and caudate liver lobes was performed. Unfortunately, the patient did not recover from surgery because of hypotension and hypothermia. The mass on histopathology was mainly composed of the polygonal to spindle shaped neoplastic cells characterized by deeply basophilic cytoplasm, prominent nucleoli, no duct-like structures, and frequent mitotic figures. The hepatic mass in the all right medial, right lateral and caudate lobes was confirmed as hepatoblastoma (Fig 3).

Discussion

Hepatoblastoma is the most common hepatic tumor in children; it is usually found during the first three years of life, and most patients are younger than two years (12,14). In human medical practice, 90% of hepatoblastoma are diag-
nosed in the first five years of life, and rarely in patients older than 20 years (14). Hepatoblastoma in animals has been reported in a 13 years old dog and an 8 years old cat (2,12). However, it has not previously been reported in young dogs. In this study, the dog was nine years old at the time of diagnosis. The differences in the age at incidence between humans and dogs may be related to the causes of hepatoblastoma, which are mostly obscure in humans (13). Hepatoblastoma has been associated with several inherited syndromes and gestational risk factors, especially in newborns with very low birth weights (13). In a review study of adults with hepatoblastoma, underlying hepatic fibrosis or cirrhosis and a history of viral hepatitis were identified in several patients (11). The causes of hepatoblastoma in dogs are unknown; however, underlying hepatic disease may play a more influential role than do hereditary factors in old dogs, as with hepatoblastoma in adult humans. Hepatoblastoma in neonatal or young dogs has not been studied previously, therefore, further studies are needed.

CT features of hepatoblastoma have not been reported in dogs and cats, but those of other hepatic tumors have been studied (4,5,7,8,15). In one study, the maximal transverse diameter of > 4.5 cm and heterogeneous enhancement in the delayed phase were significantly associated with malignant hepatic tumors (8). In addition, the contrast enhancement of masses with values of < 37 HU in the delayed phase was indicative of malignant lesions associated with necrosis (5). CT findings of canine hepatocellular carcinoma, which is the most common primary hepatic tumor in dogs, are heterogeneous enhancement in arterial, portal and delayed phases (7), central and marginal enhancement in the arterial phase (4), hypodensity in portal and delayed phases (4), cyst-like lesions (4), capsule formation (4), and dilated blood vessels in the tumors (15). In the present study, the maximal transverse diameter was 8.3 cm, and the mass was heterogeneous enhancement with attenuation values lower than normal hepatic parenchyma in all postcontrast phases. Our CT findings of hepatoblastoma were similar to those of canine malignant hepatic tumors, except for dilated blood vessels of hepatocellular carcinoma.

In humans with hepatoblastoma (1,3,9), diagnostic imaging findings have included calcification representing osteoid in 55% of cases (3). In the CT examination, most tumors were in the right hepatic lobe, and non-contrast and/or post-contrast scans demonstrated sharply delineated masses (3). In another CT study in children, the tumors were large, diffuse, or multifocal with lower attenuation than normal hepatic parenchyma after enhancement, and areas of speckled or amorphous calcifications within the tumors were found in several patients (1). Moreover, all lesions in neonates showed heterogeneously significant contrast enhancements with multiple nodules or a striped appearance in the arterial phase (9). The CT findings in humans, including the calcification and multiple nodules or stripes in masses with contrast enhancement, were not identified in our patient. The reason may be the patient’s age and the cause of hepatoblastoma development. Because this study is the only report on CT findings of hepatoblastoma in a dog, comparative studies of additional CT findings in dogs with hepatoblastoma are needed.

Of children with hepatoblastoma, 10-20% have pulmonary metastases (15). Lungs are the most frequent site of metastasis from hepatoblastoma; metastases may also appear in bone, the brain, the eyes, and the ovaries (14). In adults with hepatoblastoma, lymph node metastases were observed in a few cases (11). The survival rates of human patients with hepatoblastoma vary, depending on the staging (14). The rate of cure of hepatoblastoma is reported to be 60% in humans with surgically resectable tumors at the time of diagnosis (1). However, most adults with hepatoblastoma have died shortly after surgical or medical treatment (11). In a previous study, no macroscopic abnormalities were found in a dog with hepatoblastoma, except for enlargement and hardening of the colonic and mesenteric lymph nodes; the dog died of heart failure two years after the tumor was diagnosed (12). The prognosis in dogs with hepatoblastoma depends on metastasis and age. Further clinical studies of hepatoblastoma in dogs are needed.

**Conclusion**

This is the first case report about CT findings of hepatoblastoma in a dog. These findings were similar to those of other malignant hepatic tumors in dogs. Hepatoblastoma is rare in dogs and should be considered in the differential diagnosis in old dogs with malignant hepatic tumor.

**Conflict of Interest**

No conflicts of interest have been declared.

**References**