Clinical case: primary hepatic hemangiosarcoma in a cat

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Introduction

Hepatic hemangiosarcoma, which is derived from sinusoidal endothelial cells or Kupffer cells, are rarely observed in dogs, cats and cattle [8, 9, 12, 14]. This neoplasm is relatively uncommon compared with hepatocellular carcinoma and cholangiocarcinoma. The liver is a relatively uncommon primary site for hemangiosarcoma compared with spleen and heart [8, 13]. In cats, hepatic neoplasms except for lymphomas are rare and the reported occurrence is varying from 1 to 3% of all feline neoplasms [2, 12, 15]. The hepatic neoplasm in cats may occur as single mass as well as nodular masses [12]. Biochemistry and ultrasonography can provide useful information on changes of blood parameters and location of the suspected tumour in dogs and cats [9, 11-13]. This report provides clinical findings, biochemistry, ultrasonography and histopathology of a primary hepatic hemangiosarcoma in a cat.

Case History

An eight year-old female shorthair cat was referred with two weeks of history of polyuria, polydipsia, anorexia, lethargy, weight loss and abdominal swelling. The cat had abdominal effusion and palpable masses of 3-8 cm in diameter in the cranio-ventral and medio-ventral abdominal regions. Blood was collected and allowed to clot at 21°C during one hour, then centrifuged at 2 000 g for 10 minutes at 4°C to obtain serum sample. All biochemical tests were analyzed using Olympus AU 2700 analyzer according to the methods given in prospectuses of Olympus diagnostic kits. The serum α-feto-protein (AFP) concentration was measured by immunoenzymetric assay with human antiserum (Abbott, AFP-EIA, USA). Ultrasonography was performed through the abdomen wall with a 6 MHz linear transducer (Shimadzu, SDU 450) without anaesthesia. The cat unexpectedly died after the ultrasonographic examination and necropsy was performed 2 hours after death.

Results

The observed biochemical values were presented in Table I, as well as the normal reference ranges of serum biochemical parameters [7] and normal α-fetoprotein (AFP) values for dogs [10]. The biochemical analysis revealed high serum activities of aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), and α-amyrase, and high urea, triglyceride, cholesterol and glucose concentrations while creatinine, albumin and AFP concentrations were within normal ranges.

Anechoic to hypoechoic areas (26-50 mm) were observed in the liver indicating blood and tissue respectively (Figure 1). Abdominal effusion was detected as an anechoic fluid. At necropsy, large solitary masses were observed in all liver lobes. These masses were spherical in shape and were well-circumscribed, moderately firm, with discrete nodules of 0.5 to 10 cm in diameter (Figure 2a). They had a mottled appearance with dark red and light yellowish solid and blood-filled cavernous...
areas on a cut surface (Figure 2b). Peritoneal implants were scattered in hemorrhagic areas where dark red gelatinous material lakes consistent with recently-formed blood clots were also observed. Several small tumours were found in the omentum and the mesentery (Figure 3). In addition, a nodular mass of 4 x 2.5 cm² was found within the root of the mesentery (Figure 4). Numerous small capillary like structures lined by neoplastic endothelial cells were observed in the tumour tissue (Figure 5a and b). Large blood-filled spaces and the vascular channels were also occasionally observed. Individual hepatocytes were scattered among the neoplastic sinusoidal endothelial cells. These cells were usually spindle-shaped with relatively scanty cytoplasm and elongated ovoid nuclei and they had a high nuclear to cytoplasm ratio. Tumour polygonal-shaped cells with oval or round nuclei were found in the same areas. Individual giant cells were occasionally found and mitotic figures were frequently observed. Central necrosis and erythrocyte accumulation were also prominent findings. No other malignant cell was detected in any other organ.

### Biochemical parameters

<table>
<thead>
<tr>
<th>Biochemical parameters</th>
<th>Observed values</th>
<th>Normal ranges</th>
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<tbody>
<tr>
<td>AST (U/L)</td>
<td>327</td>
<td>26-43</td>
</tr>
<tr>
<td>ALT (U/L)</td>
<td>216</td>
<td>6-83</td>
</tr>
<tr>
<td>ALP (U/L)</td>
<td>106</td>
<td>25-93</td>
</tr>
<tr>
<td>α-amylase (U/L)</td>
<td>1226</td>
<td>185-700</td>
</tr>
<tr>
<td>Urea (mmol/L)</td>
<td>8.2</td>
<td>3.3-5.0</td>
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<tr>
<td>Creatinine (µmol/L)</td>
<td>88.4</td>
<td>70.7-159.0</td>
</tr>
<tr>
<td>Glucose (mmol/L)</td>
<td>11.3</td>
<td>3.9-6.1</td>
</tr>
<tr>
<td>Triglycerides (mmol/L)</td>
<td>7.3</td>
<td>0.1-1.3</td>
</tr>
<tr>
<td>T. Cholesterol (mmol/L)</td>
<td>3.7</td>
<td>2.5-3.4</td>
</tr>
<tr>
<td>Albumin (g/L)</td>
<td>28</td>
<td>21-33</td>
</tr>
<tr>
<td>AFP (µg/L)</td>
<td>0.6</td>
<td>0.0-10.0</td>
</tr>
</tbody>
</table>

Table 1: Serum biochemical parameters in the presented cat and normal ranges. Values indicated in bold are outside the normal ranges of the biochemical marker.

**FIGURE 1:** Ultrasonographic appearance of the mass in the liver. Mark the anechoic areas as blood-filled structure and hypoechoic areas as tumour masses (arrows).

**FIGURE 2:** Surface (a) and cut surface (b) appearance of prominent tumour masses in liver with dark red and light yellowish areas. Mark the blood-filled cavernous structure (arrow) on cut surface.

**FIGURE 3:** Peritoneal tumour implants (arrows) in the omentum and mesentery.

**FIGURE 4:** A solid nodular tumour mass with haemorrhagic areas (arrow) in the root of mesentery.
Discussion

Hepatic neoplasms are rare feline neoplasms and particularly hepatic hemangiosarcomas are exceptional in this species [9]. Primary hepatic hemangiosarcoma was diagnosed by clinical, biochemical, ultrasonographical and pathological findings in this case.

Polyuria, polydipsia, anorexia, lethargy, weight loss and abdominal swallowing in the presented cat can evoke liver and/or kidney chronic diseases. Anorexia and lethargy often associated with nausea or vomiting [12, 14] are the most common clinical signs in malignant cats. Although nausea and vomiting were absent in the presented cat, cancer cannot be excluded.

Ultrasonography is helpful for the detection of hepatic masses and ultrasonographic imaging can also provide information on the location and extent of the masses suspected to be of hepatic origin [3, 9]. Masses observed in the present case could be evaluated as blood-filled structure for anechoic areas and tumour masses for hypoechoic areas in liver. Elevations of serum AST, ALT and ALP activities have been reported in cats with both benign and malignant liver masses [5, 9, 14]. High serum AST, ALT and ALP activities indicate cholangio-hepatocellular degeneration in the present case. Prominent tumour masses in the liver may lead to destruction of both hepatocellular and cholangiocellular tissues. An increase of α-amylase activity may result from abdominal effusion which was detected in ultrasonography and confirmed by necropsy. The abdominal effusion detected in the cat was not caused by an alteration of the protein metabolism because the observed albumin concentration was within normal ranges. The abdominal effusion may result from capillary changes seen in the presented case and effusion may directly affect pancreatic tissue in the abdomen [4]. Alterations of triglyceride and cholesterol concentrations would be associated with hemangiosarcoma: lipoprotein (VLDL) synthesis and the lipoprotein lipase activity would be depressed during hemangiosarcoma [5] leading to decrease of LDL formation. Consequently, triglyceride (associated to VLDL) and cholesterol (associated to LDL) concentrations would be lowered. However, in the present case, triglyceride and cholesterol concentrations as well glycaemia were markedly elevated, suggesting the release of hyper-glycaemic hormones under stressful physical examination (catecholamines for example). Increases of some biochemical parameters and ultrasonographic findings presented above would direct the diagnosis towards a hepatic neoplasm without indicating the type in this case.

The determination of the serum α-fetoprotein (AFP) concentration is a useful screening test in dogs with primary hepatic tumours [6, 10]. Because normal reference ranges for cats have not been reported yet, the AFP value obtained in the cat was evaluated according to the reference values reported for dogs. As AFP is mostly produced by dedifferentiated neoplastic hepatocytes [5], cholangiocarcinoma or hepatocellular carcinoma may be presumed in adult dogs when AFP value is above 250 µg/L [10]. In the present cat, the serum AFP concentration was 0.6 µg/L and this low value was probably related to the parenchyma destruction due to hemangiosarcoma, as revealed by histopathological examinations.

Several studies of canine neoplasms have been indicated that the liver is a relatively common primary site after spleen, heart and subcutaneous tissue [8]. A high incidence of hepatic, bone-related and pulmonary hemangiosarcomas in Beagles with internally deposited radionucleides were observed [1]. RING et al. [14] diagnosed the hepatic hemangiosarcoma with metastatic pulmonary hemangiosarcoma. The cat reported here had similar findings but only metastasized to the root of the mesentery and had peritoneal implantations. GORES et al. [4] reported one case of hemangiosarcoma with chylous ascite in cats stemming from omentum or lymph nodes. Hemangiosarcoma includes many immature, pleomorphic, endothelial cells which form blood-filled vascular spaces or solid masses of cells. Haemorrhage frequently occurs within these tumours and ischemic necrosis occurs. Although hemangiosarcoma is clearly invasive and tends to metastasize to the lung [8, 13], no pulmonary metastasis was found in the cat. Rupture into the peritoneal sac may result in implantations of tumour on the peritoneal surface [6, 8, 13]. Capillary-like and blood-filled cavernous structures on cut surface indicate a connection between big and little masses (Figure 2b). Prominent tumours in liver include neoplastic...
tissue with dark red and light yellowish solid areas in the bigger part on cut surface and were associated with neoplastic sinusoidal endothelial cells lying inside normal parenchyma. These findings clearly indicate that hemangiosarcoma has primarily originated from liver endothelial cells.

As a result, the case reported here was diagnosed as primary hepatic hemangiosarcoma in an eight year-old cat presenting polyuria, polydipsia, anorexia, lethargy, weight loss and abdominal swallowing. Whereas clinical signs have evoked a chronic disease, and ultrasonography and biochemistry have evidenced a hepatic neoplasm, the certainty diagnosis was based on histological findings.

References


