

Evaluation of common liver masses and clinical and operative findings in a dog

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Abstract: In this case report, it was aimed to evaluate the clinical, laboratory and operative findings of liver masses encountered in a 13-year-old Golden Retriever dog. It was determined that the dog who presented with complaints of difficulty in walking and swelling in the abdominal region had an excessive swelling in the abdominal region and an asymmetrical appearance. It was determined that hematocrit (HCT), red blood cells count (RBC) and hemoglobin level (HGB) decreased significantly, while alanine aminotransferase (ALT) activity increased critically. The radiographic and ultrasonographic examination of the abdomen, it was determined that the internal organs were not visible and abnormal fluid was accumulated. An experimental laparotomy was performed. During the operation, tumor-like masses in different sizes were determined on the liver lobes. In the postoperative period, the patient was euthanized at the request of the owner, due to the worsening of the patient's health condition and the recurrence of abdominal distension.

Keywords: Dog, liver, mass, tumor.

Bir köpekte karşılaşılan yaygın karaciğer kitleleri ile klinik ve operatif bulgularının değerlendirilmesi

Özet: Bu olgu sunumunda 13 yaşındaki Golden Retriever ırkı bir köpekte karşılaşılan karaciğer kitlelerinin klinik, laboratuvar ve operatif bulgularının değerlendirilmesi amaçlandı. Yürüme güçlüğü ve karın bölgesinde şişlik şikayeti ile gelen köpeğin abdominal bölgesinde aşırı bir şişlik olduğu ve asimetrik bir görünümünün olduğu belirlendi. Hematokrit değeri (HCT), alyuvar miktarı (RBC) ve hemoglobinin düzeyinin (HGB) belirgin olarak düştüğü, alanine aminotransferase (ALT) düzeyinin ise kritik düzeyde arttığı belirlendi. Abdomenin radyografik ve ultrasonografik muayenesinde iç organların net olarak görünmediği ve anormal bir sıvı biriktiği belirlendi. Deneysel laparotomi yapıldı. Operasyon sırasında karaciğer lobları üzerinde farklı boyutlarda tümör benzeri kitlelerin olduğu belirlendi. Postoperatif dönemde hastanın sağlık durumunun kötüye gitmesi ve karın şişliğinin nüksetmesi sebebiyle hasta sahibinin isteğiyle hasta ötenazi edildi.

Anahtar kelimeler: Köpek, karaciğer, kitle, tümör.

Introduction

Primary liver tumors account for only 0.6% to 1.5% of all tumor cases encountered in dogs (Liptak et al., 2013; Patnaika et al., 1980). The incidence of liver tumors developing because of metastasis of tumors originating from the spleen, pancreas, and gastrointestinal system is 2.5 times higher than primary liver tumors. While liver tumors are mostly malignant in dogs, they are benign in cats (Liptak et al., 2013).

Primary liver tumors can be seen in three different morphologies such as solid, nodular and diffuse (Liptak et al., 2013; Saritaş et al., 2014). Solid masses are limited to a single liver lobe, while nodular masses occur in more than one liver lobe (Liptak et al., 2013). The most radical technique in the treatment of liver masses is lobectomy (Saritaş et al., 2014). Hepatocellular carcinomas and benign tumors with solid character have a good prognosis after surgical extirpation and a low risk of recurrence (Liptak et al., 2013).

Hemangiosarcoma is a prevalent form of sarcoma affecting the liver in dogs (Kang et al., 2009; Karabağlı et al., 2011). It is characterized by the development of malignant tumors originating from vascular endothelial cells, commonly observed in the spleen, right atrium, and liver (Hirsch et al., 1981; Kang et al., 2009; Martins et al., 2013; Park et al., 2016). Certain breeds, including German Shepherds, Golden Retrievers, Labrador Retrievers, Boxers, Schnauzers, and Bernese Mountain Dogs, have been found to have a predisposition to hemangiosarcoma, which is typically diagnosed in older dogs (Hirsch et al., 1981; Karabağlı et al., 2011; Martins et al., 2013). In hemangiosarcoma cases, clinical symptoms often differ according to the organ where the tumor is located. The most important symptom seen in hepatic hemangiosarcomas is the hemoperitoneum due to intra-abdominal hemorrhages. An increase in abdominal volume and an asymmetrical appearance occur due to hemoperitoneum (Martins et al., 2013; Park et al., 2016).

In this case report, it was aimed to evaluate the clinical, laboratory and operative findings of liver masses encountered in a 13-year-old Golden Retriever dog.

Case Description

The case involved a 13-year-old male Golden Retriever dog who had been brought to Firat University Animal Hospital due to a complaint of pronounced abdominal swelling. During the history assessment, it was revealed that the dog had been experiencing fatigue, gait disturbance, and excessive abdominal swelling for the past month.

During the clinical examination, thorough inspection and palpation revealed a notable and asymmetrical swelling in the abdomen. Additionally, it was observed that the dog exhibited signs of dehydration, and the capillary refill time was delayed. Radiographic examination indicated indistinct visualization of the abdominal organs, accompanied by abnormal fluid accumulation in the abdomen (Figure 1). Subsequent ultrasonographic examination was impeded by the presence of fluid accumulation, hindering the assessment of internal organs. The puncture procedure was performed to determine the nature of the abdominal fluid, which confirmed the presence of blood (hemoperitoneum).

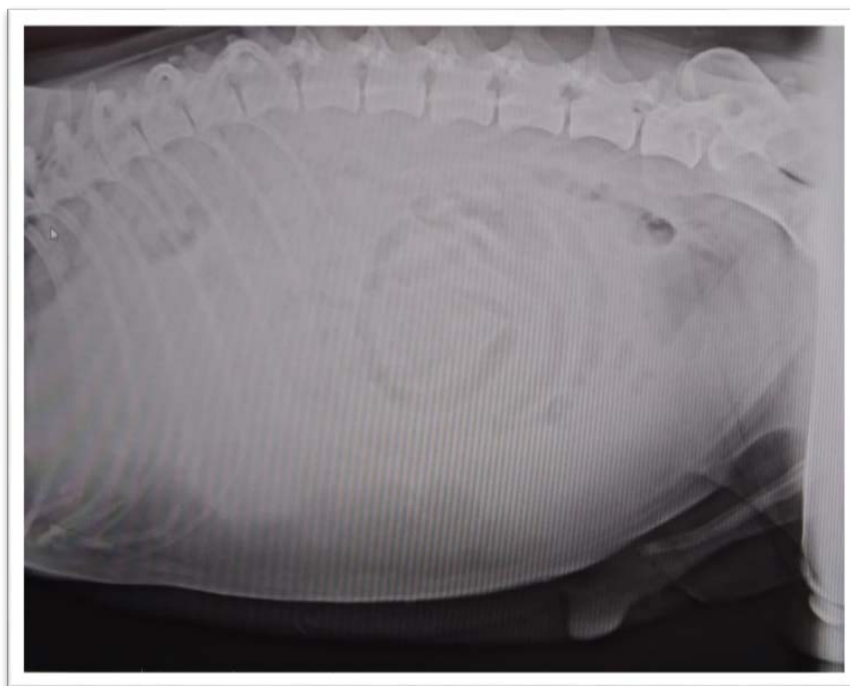


Figure 1. Laterolateral abdominal radiograph.

The dog's hemogram examination revealed an elevated count of granulocytes, while there was a significant decrease in critical values such as hematocrit (HCT), red blood cells count (RBC), and hemoglobin (HGB) (Table 1).

Table 1. Results of some hemogram parameters.

Parameter	Values	Unit	References Value
RBC	1.53	$10^{12}/L$	4.95-7.87
HGB	3.3	g/dL	11.9-18.9
HCT	10.4	%	35-57
PLT	151	$10^9/L$	211-621
MCV	68.1	fL	66-77
MCH	21.5	pg	21-26.2
MCHC	32.0	g/dL	32-36.3

RBC: red blood cells, HGB: hemoglobin, HCT: hematocrit, PLT: platelet, MCV: mean cell volume, MCH: mean cell hemoglobin, MCHC: mean cell hemoglobin concentration.

Moreover, the routine biochemical analysis of blood serum indicated a notable increase in levels of Alanine aminotransferase (ALT), amylase (AMY), glucose (GLU), albumin (ALB), and creatine kinase (CK). Additionally, the dog exhibited hypoalbuminemia and hypoproteinemia (Table 2).

Table 2. Results of some blood biochemistry parameters.

Parameter	Values	Unit	References Value
ALT	481	U/L	10-118
ALP	21	U/L	20-150
CK	422	U/L	20-200
AMY	> 3000	U/L	400-2500
GLU	30.84	Mmol/L	3.89-7.95
ALB	18.3	g/L	22-44
TP	47.7	g/L	52-82

ALT: alanine aminotransferase, ALP: alkaline phosphatase, CK: creatine kinase, AMY: amylase, GLU: glucose, ALB: albumin, TP: total protein.

After performing a puncture procedure, it was observed that the bloody fluid in the dog's abdominal cavity re-accumulated one week following its initial drainage. Based on clinical and laboratory examinations, there was a suspicion that the condition may involve progressive hepatocellular damage. Due to the respiratory distress and increased fatigue caused by the hemoperitoneum, an experimental laparotomy was deemed necessary with the consent of the dog's owner.

The surgical site for the operation was prepared spanning from the dog's tenth intercostal space to the aperture pelvis cranialis. The dog was administered 2 mg/kg xylazine hydrochloride intramuscularly, followed by 10 mg/kg ketamine hydrochloride as described by Safak et al. (2021) for general anesthesia, approximately 10 minutes later. A median incision was made, starting 2 cm caudal to processus xiphoidea to the 2 cm cranial to the dog's penis. By conducting blunt dissection, the subcutaneous connective tissues were separated, exposing the line alba (Figure 2). Using scissors with a blunt end, the abdominal cavity was accessed. Subsequently, approximately 8 liters of bloody fluid was drained via an aspirator. Following fluid drainage, a comprehensive examination of all abdominal organs, particularly the liver, was performed, revealing no pathological formations except for the presence of numerous nodular masses of varying sizes in the liver. The affected liver lobes were carefully taken out from the abdomen and inspected (Figure 2). Based on the patient's age, breed, and clinical examination findings, hemangiosarcoma was suspected. Masses were taken for biopsy from the liver lobes of the patient. The abdominal cavity was closed using standard surgical procedures, and the skin was sutured with simple separate stitches. Postoperatively, the patient received intramuscular amoxicillin-clavulanic acid with a dosage of 8.75 mg/kg/day for one week. Pain management was provided with intravenous administration of meloxicam at a dose of 0.3 mg/kg/day for one week. The dog's owner was informed about the option of starting chemotherapy for the patient. In the initial week following the surgery, the patient's general condition was good, attributed to the evacuation of the hemoperitoneum. However, on the tenth

postoperative day, due to the recurrence of abdominal distension, worsening general condition, and unfavorable prognosis, and at the request of the owner, the patient was euthanized. According to the morphological structure of the masses, it was thought that it might be hemangiosarcoma, since the patient's owner did not accept the necropsy of the patient after euthanasia and the histopathological results were not reported to us.

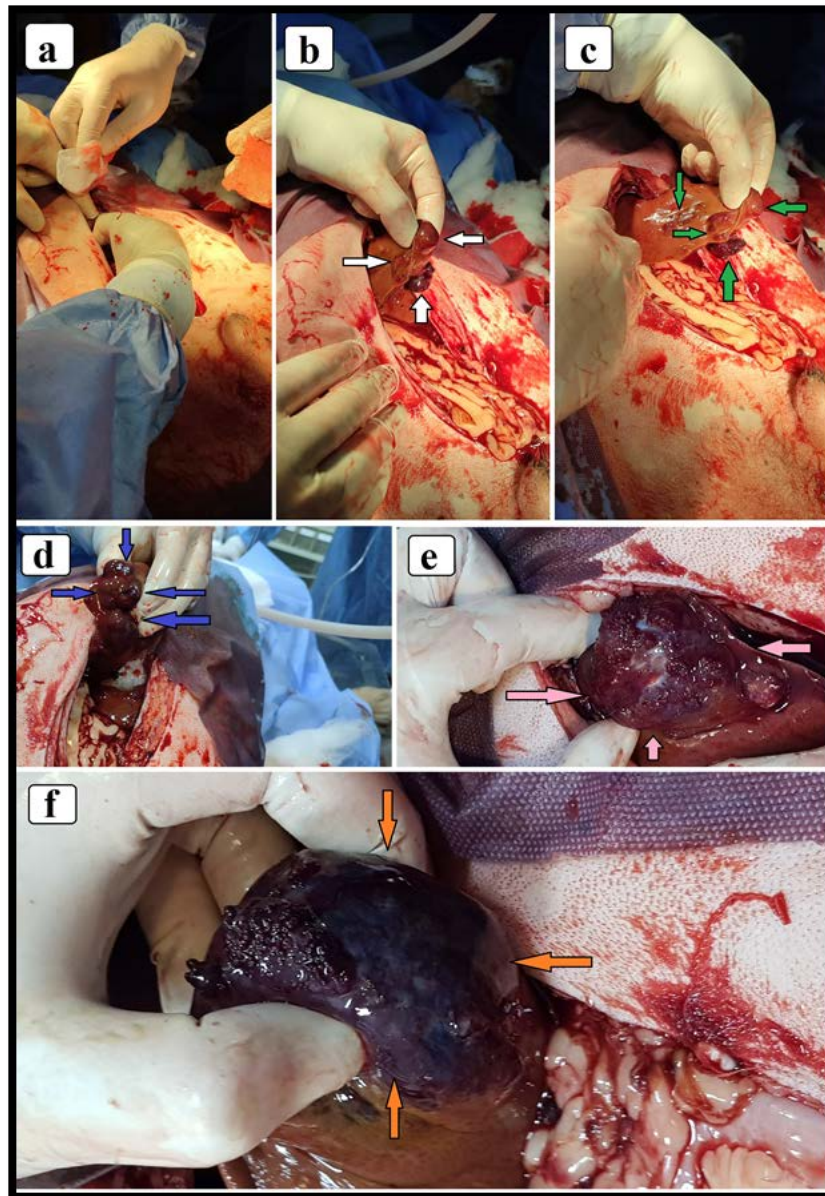


Figure 2. Incision of the laparotomy line (a), removal of the liver from the abdomen (b), appearance of different nodular masses on the liver lobes (b. c. d. e. f) (arrows).

Discussion

Only 0.6% to 1.5% of tumors in dogs are of hepatic origin (Patnaika et al., 1980; Liptak et al., 2013). The incidence of liver tumors, which are formed because of metastasis of tumors originating from the spleen, pancreas and digestive system, is higher (Liptak et al., 2013). Park et al. (2016) reported that the tumor in a Siberian Husky dog, in which they detected hemangiosarcoma in its liver, originated in the spleen. Martins et al. (2013) reported that a Pinscher dog with hemangiosarcoma detected in the left lobe of its liver had dark red or black nodular lesions on the lung, kidney, stomach and peritoneum. Kang et al. (2009) reported that they found primary hemangiosarcoma in the liver of a Schnauzer dog. In this case report, a large number of tumoral formations were detected in the liver of the dog, and other organs were macroscopically normal, and it was thought that it might be a tumor of liver origin.

Hemangiosarcoma is recognized as one of the most prevalent liver tumors in dogs, commonly observed in older individuals. Certain breeds such as German Shepherds, Golden Retrievers, Labrador Retrievers, Boxers, Schnauzers, and Bernese Mountain dogs are known to have a predisposition to this condition (Hirsch et al., 1981; Kang et al., 2009; Karabağlı et al., 2011; Martins et al., 2013). Park et al. (2016) reported a case of hepatic hemangiosarcoma in a Siberian Husky (12 years old), and it also been described in 3 years old Pinscher dog (Martins et al., 2013) and 6 years old Schnauzer dog (Kang et al., 2009). In the present case report, we discussed the encounter of numerous masses, suspected to be primary liver hemangiosarcoma, in a 13-year-old Golden Retriever dog.

The most common clinical finding in liver hemangiosarcomas is hemoperitoneum due to intra-abdominal hemorrhages. Due to hemoperitoneum, an increase in volume and an asymmetrical appearance occur in the abdomen. Exercise intolerance and prolongation of capillary filling time are other important symptoms encountered in hepatic hemangiosarcoma cases (Kang et al., 2009; Martins et al., 2013; Park et al., 2016). In this case report, it was determined that the dog's abdominal volume increased due to hemoperitoneum and had an asymmetrical appearance. Again, the dog's exercise intolerance and the delayed capillary refill time are compatible with the literature. Kang et al. (2009) reported that the serosal details disappeared in the abdominal radiograph of the dog with hepatic hemangiosarcoma and the fluid was homogeneously distributed to the abdomen. In this case report, the presence of abnormal fluid accumulation in the abdomen and the inability to visualize the abdominal organs in the radiographic and ultrasonographic examinations are compatible with the literature.

Similar to many other diseases, hemangiosarcoma cases lead to alterations in hematological and blood biochemistry parameters. In a study by Park et al. (2016) involving a

dog with spleen-derived hemangiosarcoma, a decrease in HCT, HGB, and platelet (PLT) levels were observed, alongside a significant increase in ALT, AST, and ALP activities. Similarly, Kang et al. (2009) reported a case of primary liver hemangiosarcoma in which HCT and PLT levels decreased, while ALT, AST, and ALP activities increased significantly. Hypoglycemia, hypoalbuminemia, and hypoproteinemia were also detected in the dog. In this case report, it was determined that the dog with a liver-originating mass exhibited a decrease in RBC, HCT and HGB values, along with a significant increase in serum ALT, CK, and AML activities. Additionally, the dog was found to have hypoalbuminemia and hypoproteinemia. In the context of hepatic hemangiosarcomas, the dog's history, clinical examination findings, as well as HCT, HGB, and ALT activities, were deemed crucial markers. Unlike other cases, the increase in AML value suggested that the dog also had pancreatic damage.

Liver tumors can be seen in solid, nodular, or diffuse morphologies (Liptak et al., 2013; Saritaş et al., 2014). Solid masses are limited to a single liver lobe, while nodular masses occur in more than one liver lobe (Liptak et al., 2013). The most radical technique in the treatment of liver masses is lobectomy. Another option in the treatment of hepatocellular carcinomas, other than lobectomy, is liver transplantation (Saritaş et al., 2014; Atlas et al., 2021). Park et al. (2016) reported that they applied lobectomy and splenectomy to the dog they detected hemangiosarcoma in the left lobe of the liver and spleen. They reported that they wanted to apply chemotherapy in the postoperative period, but the patient's owner did not accept it. They reported that the mass metastasized to the lungs in the following period and the patient died in a short time. Kang et al. (2009) reported that they started symptomatic treatment for a dog with primary hepatic hemangiosarcoma, but then discontinued the medication due to the owner's further investigations and refusal to treat. It was reported that the patient died in a very short time. In this case report, it was decided to administer chemotherapy because the mass was nodular and diffuse morphology, lobectomy would not yield any results, and finding the necessary donor for liver transplantation was even more difficult than human medicine. However, the patient's general condition deteriorated, the prognosis was unfavorable, and the patient was euthanized at the request of the owner.

Conclusion

In conclusion, in this case report, clinical, laboratory, and operative findings of diffuse liver masses observed in a dog with clinical and laboratory findings consistent with primary liver hemangiosarcoma, which is rarely encountered in dogs, and is known to have an unfavorable prognosis, were discussed. It has been concluded that this case report will

contribute to the literature and form a basis for treatment options that can be developed in the future.

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Ethical Statement

This study does not present any ethical concerns.

Conflict of Interest

The authors declared that there is no conflict of interest.

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