

## Primary Renal Hemangiosarcoma Complicated with Hematuria and Hemoperitoneum in a Dog

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**Abstract :** A 14-year-old intact male Siberian Husky was presented with hematuria, lethargy, and anorexia of 1-month duration. The physical examination revealed mild abdominal distension and pain. The hematology and serum chemistry revealed anemia and severe azotemia. The radiographic examination revealed renomegaly and the ultrasonographic examination, indistinct cortico-medullary junction, increased renal cortex echogenicity, and irregular margination. The urinalysis showed proteinuria and hematuria. The differential diagnosis included renal failure, cystitis, pyelonephritis, and neoplasia. The patient's condition continued to deteriorate, and the dog eventually died. The gross findings from the necropsy revealed hemoperitoneum and a bilateral renal mass. HSA was diagnosed by histopathological examination. This case report describes primary bilateral renal hemangiosarcoma (HSA), which is uncommon in dogs.

**Key words :** dog, hemangiosarcoma, renal tumor.

### Introduction

Hemangiosarcoma (HSA) is a malignant tumor that originates from the endothelium of blood vessels (1,7,8). It is also a common neoplasia in medium-aged to older dogs (3,8,9). In retrospective studies, the most common primary site of HSA is the spleen (25-28%), right atrium (3-5%), and skin and subcutis (3%) (2,6,9). Rupture of the primary site is seen in dogs with splenic or hepatic HSA, and this often leads to hemoperitoneum and hemorrhagic shock (4,9,10). The incidence of HSA in dogs with anemia and hemoperitoneum that requires blood transfusion is approximately 70%, but the prognosis is poor (10,17). Spontaneous rupture has been considered an unusual HSA complication (3,13). Primary renal HSA has been sporadically reported but is uncommon (11).

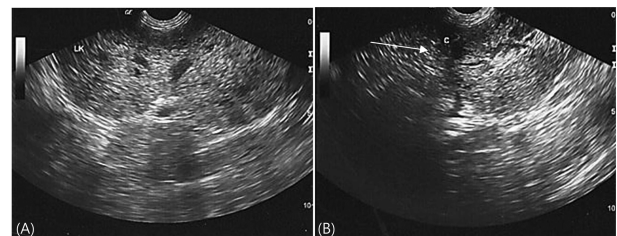
This case report describes primary bilateral renal HSA that caused hemoperitoneum and hematuria in a dog.

### Case

A 14-year-old, 25 kg intact male Siberian Husky was presented with hematuria of 1-month duration. The physical examination revealed lethargy, mild abdominal distension, and abdominal pain. The vital signs, which included the rectal temperature, respiration rate, and heart rate, were unremarkable. The differential diagnosis included renal failure, cystitis, pyelonephritis prostatitis, and urinary tract tumor. The hema-

tological analysis revealed regenerative anemia [red blood cells (RBC)  $4.38 \times 10^6/\mu\text{l}$ , reference range  $5.5-8.5 \times 10^6/\mu\text{l}$ ; hemoglobin 9.5 gm/dl, reference range 12-18; and packed cell volume (PCV) 30%, reference range 37-55%; reticulocyte index 1.6, reference range 0-1] and thrombocytopenia ( $61 \times 10^3/\mu\text{l}$ , reference range  $200-500 \times 10^3/\mu\text{l}$ ); and the serum biochemical analysis showed severe azotemia [blood urea nitrogen (BUN) 133 mg/dl, reference range 8-26 mg/dl; and creatinine 10.6 mg/dl, reference range 0.5-1.3 mg/dl]. The direct blood smear revealed acanthocytosis. The urine analysis indicated proteinuria, hematuria, and hypersthenuria [proteinuria 3+, hematuria 4+, and urine-specific gravity 1.035 (reference range 1.008-1.012)]. The urine cytology revealed mixed infection (cocci plus rod-form bacteria).

Bilateral renomegaly was detected from the abdominal radiographic examination. The ultrasonographic examination



**Fig 1.** Transverse ultrasonography of the left kidney. (A) An irregular cortico-medullary junction and hyperechoic renal parenchyma were identified. (B) Loss of the continuous connection of the renal tissue and the presence of abdominal fluid in the cranial part of the kidney were detected (white arrow).

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**Table 1.** Abdominal fluid analysis

Parameter	Abdominal fluid	Reference range
Color	Red	Red
Turbidity	Opaque	Opaque
Total protein (g/dl)	5.9	> 5.5
Specific gravity	1.030	1.007-1.027
WBC ( $\times 10^3/\mu\text{l}$ )	17.83	
pH	7	
Creatinine/potassium (mg/dl)	10.9/4.3	Reference range of hemorrhage
Triglycerides (mg/dl)	71	
Bilirubin (mg/dl)	0.21	
Lipase/amylase (U/L)	79/1546	
PCV (%)	25	

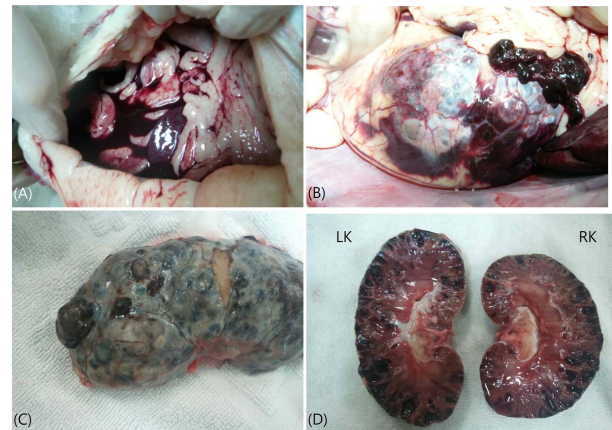
**Table 2.** Urine analysis

Parameter	Urine	Reference range
Color	Red	Yellow
Turbidity	Opaque	Clear
Total protein (g/dl)	6.0	-
Specific gravity	1.035	1.008-1.012
WBC ( $\times 10^3/\mu\text{l}$ )	16.04	-
pH	7	6-7.5

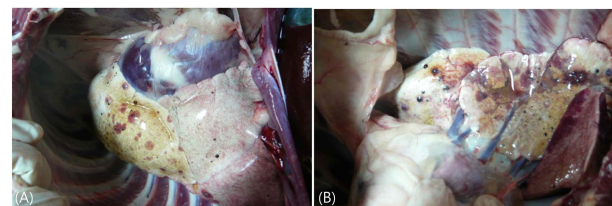
**Table 3.** Blood analysis

Parameter	Blood	Reference range
Color	Red	Red
Turbidity	Opaque	Opaque
Specific gravity	1.035	> 1.012
WBC ( $\times 10^3/\mu\text{l}$ )	15.91	6-17
Triglycerides (mg/dl)	71	17-133
Bilirubin (mg/dl)	0.19	0-0.4
Lipase/amylase (U/L)	82/1736	0-500/185-700
PCV (%)	30	37-55

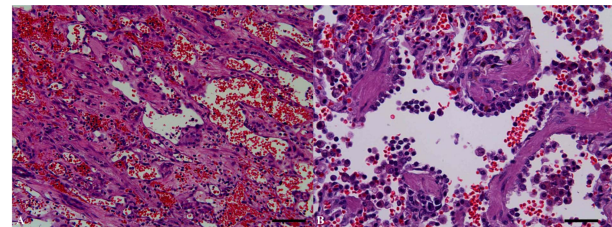
showed loss of the continuous connection of the renal cortex and the presence of abdominal fluid in the cranial part of the right kidney (Fig 1). There were no remarkable findings, however, in the liver, spleen, urinary bladder, and prostate. The abdominocentesis revealed hemo-abdomen (Table 1,2,3). The dog's condition continued to deteriorate. The hematological analysis revealed severe anemia; and the blood gas analysis, acidosis (pH 7.184, reference range 7.30-7.45). Through the aforementioned test, renal rupture was tentatively diagnosed. Hypovolemic shock caused by the renal rupture was suspected. Therefore, blood transfusion and medical treatment of acidosis were performed. Two hours later, the dog died. Necropsy was performed and showed a hemoperitoneum and a bilateral renal mass with a red to black color and firm nodules on the surface. Hemorrhage and blood clots were detected



**Fig 2.** Postmortem findings of the primary renal hemangiosarcoma in this case. (A) Hemorrhagic effusion was observed in the left kidney. (B) Hemorrhage and adhesion of the peritoneum were also observed in the left kidney. (C) Firm and dark nodules were observed completely over the cortex. (D) A blood-filled renal cortex and necrosis were observed.



**Fig 3.** The postmortem findings of a metastatic lesion. The firm and dark nodules on the lung were detected (A), (B).



**Fig 4.** Microphotographs of the histopathology. (A) The kidney and (B) lung. (A) Loss of the tubular structure and undifferentiated tumor cells creating an anastomosing meshwork of filled with blood of varying size were detected. H&E stain, Bar: 200  $\mu\text{m}$ . (B) Lung also revealed irregular vascular channels lined by undifferentiated tumor cells. H&E stain, Bar: 50  $\mu\text{m}$ .

on the renal cortical surface (Fig 2); and firm and dark nodules detected on the lung (Fig 3). The spleen had a normal appearance and color. To evaluate the renal mass, impression cytology was initially performed and revealed a background of erythrocytes and a population of pleomorphic spindle cells. For the histopathologic examination, tissue samples were fixed in 10% buffered formalin, embedded in paraffin, and cut into 4  $\mu\text{m}$ . Then the sections were stained with hematoxylin and eosin. The histopathologic examination revealed loss of the tubular structure and undifferentiated tumor cells creating an

anastomosing meshwork of filled with blood of varying size on kidney. The lung also revealed blood-filled vascular spaces were lined by undifferentiated neoplastic endothelial cells as kidney and bronchoalveolar structures were disappeared (Fig 4). The definite diagnosis was bilateral renal HSA with lung metastasis.

### Discussion

Primary renal neoplasia is very rare and infrequently diagnosed among dogs. It has no specific clinical signs and clinicopathological findings (1,2), so its early diagnosis is not possible. In an HSA patient with hematuria, tumor staging and careful evaluation of the urinary tract are important (6,17). In this case, there was no significant change in the urinary bladder and prostate in the ultrasonographic examination. In HSA, the most common clinical signs are weakness, weight loss, and anorexia (4,11,17). In the case reported, however, there were no clinical signs in the early stage, and only hematuria was observed in the late stage.

In a retrospective study, renal HSA occurred in 0.01% of 5-year-old dogs with HSA (7). Among dogs with HSA, 14% had hemoperitoneum without evidence of retroperitoneal hemorrhage in the ultrasonographic examination (7). In splenic HSA, 40-60% hemoperitoneum was reported (7).

In this case, the intact male dog was affected, and there was ultrasonographic evidence of renal rupture. According to the hematologic examination and the abdominal fluid analysis, the most likely differential diagnosis was renal rupture by an exterior force, a tumor, or severe pyelonephritis. The median survival time of the dogs with renal HSA that was treated with surgery alone was 190 days, and with surgery with chemotherapy (doxorubicin combination treatment), 286 days; and only 30% survived for more than one year (2,7). In the reported case, however, surgical approaches were not performed because the patient's condition rapidly deteriorated until he died. Therefore, bilateral renal HSA was detected from the necropsy. Left renal rupture was the confirmed cause of death. Though thromboembolism is the important complication in HSA (50-70%) (1), in this case, coagulation profiles unfortunately could not be produced. In the authors' knowledge, this is the first case report of bilateral renal HSA and hemoperitoneum caused by renal rupture.

### Acknowledgements

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## 개에서 발생한 혈뇨와 복강 내 출혈을 동반한 신장원성 혈관육종

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**요 약** : 14년령의 중성화 하지 않은 수컷 Siberian Husky는 1개월 전부터 혈뇨, 기면, 식욕부진을 보였다. 신체검사 상 복부 팽만과 통증을 확인할 수 있었다. 혈액 및 혈청 화학 검사상 빈혈과 질소혈증을 확인할 수 있었다. 방사선 검사 상 신장의 비대를 확인할 수 있었으며 초음파 검사 상 피수질의 경계가 불분명하며 피질의 에코가 증가한 신장을 확인할 수 있었다. 노검사 상에서는 혈뇨와 단백뇨를 확인할 수 있었으며 초기의 감별 진단으로는 신부전, 방광염, 신우신염과 종양을 생각했다. 환자의 상태는 내원 후 계속적으로 악화되었으며 폐사했다. 부검 상에서 복강 내 출혈과 양측 신장의 종양을 확인할 수 있었다. 조직검사 상에서 혈관육종을 진단하였다. 본 증례에서는 개에서 비특이적으로 발생하는 양측성의 신장원성 혈관육종에 대해서 다룬다.

**주요어** : 개, 혈관육종, 신장 종양