



CASE REPORT

Unilateral Renal Cell Carcinoma in a Dog

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ABSTRACT

A 4-year-old, neutered male, American Cocker Spaniel weighing 8.3 kg was presented with a 1-month history of weight-loss, anorexia, intermittent vomiting and bloody-diarrhea. Abnormal blood tests results, a large mass on the kidney field in radiographic views and ultrasonography were presented. Nephroureterectomy was tried, but a large mass in the kidney and metastasis to the spleen caused to decline the surgery and treatment. The dog was euthanized, and necropsy and histological review revealed the renal cell carcinoma.

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INTRODUCTION

Primary renal cancers are very rare in dogs, and its prevalence is reported to be about 1% of all canine neoplasia (Hammer and LaRue, 1995; Gil da Costa *et al.*, 2011). Most reports have showed a male predilection (Militerno, 2003; Bennett, 2004; Kobayashi *et al.*, 2008), which suggest that sex hormones may influence the occurrence of primary renal tumors. In dogs, about 85% are epithelial in origin, and over than 90% among them are malignant (Hammer and LaRue, 1995; Dernell *et al.*, 2001). Renal cell carcinoma is the most common type among the primary renal tumor (Dernell *et al.* 2001; Bennett, 2004), and generally occurs in older dogs (7-9-years-old) (Hammer and LaRue, 1995; Militerno *et al.*, 2003; Kobayashi *et al.*, 2008). However, metastases in kidney are common, and are probably caused by rich blood flow and microvascular system in kidney (Dernell *et al.*, 2001). Here we describe a canine renal cell carcinoma case with clinical records and morphologic characteristics.

History and clinical examinations: A 4-year-old, neutered male, American Cocker Spaniel weighing 8.3 kg was presented with a 1-month history of weight-loss, anorexia, intermittent vomiting and bloody-diarrhea. The patient was not on a regular vaccination program, but was under routine heartworm medication. In physical examination, pale mucous membrane, severe cachexia, dehydration, halitosis, dry-nose and blood in feces with normal cardiac rhythm, body temperature (38.1°C) and

respiratory rate were noted. Additionally, a firm mass was palpated in the left flank.

In blood tests, mild anemia (hematocrit: 35.3%, hemoglobin; 11.4 g/dl), leukocytosis (18,900 cells/ μ l), thrombocytosis (platelet: 616,000 cells/ μ l), high levels of serum AST, ALP, GGT and total bilirubin (175, 1064, 276 U/l, and 0.9 mg/dl, respectively) and low albumin (2.1 g/dl) were observed. Urinalysis revealed low specific gravity (1.008), ketonuria and hematuria.

Diagnosis and treatment response: The abdominal radiographs and ultrasonograph revealed a large, irregular mass in the left renal field (Fig. 1). Kidney-origin-mass was tentatively diagnosed, and the patient was hospitalized. Maintenance therapy for cachexia and dehydration was performed. During admission, anemia (hematocrit: decrease to 12.1%) and leukocytosis (increase to 36,700 cells/ μ l) were worsened, and intermittent thrombocytopenia (platelet: 93,000-108,000 cells/ μ l) was noticed.

Surgery planed for nephroureterectomy was done on the 4th day following admission, but great size of pale-yellowish mass and multiple metastases to the spleen let the surgery declined, and resulted in sampling for histological diagnosis. During admission after surgery, panting, tachycardia and murmur was happened, and grew worse. Additionally, occasional hypertension (systolic blood pressure: >190 mmHg) was noticed from 1 days after surgery. In histological review, transitional cell carcinoma of the renal pelvis was tentatively diagnosed, but because of small amount of specimen, pathologist insisted a further examination. Because of the aggravation

of illness, the client requested euthanasia, and a necropsy was performed.

Necropsy revealed multiple papillary-grown-irregular pale-yellowish mass in the left kidney, and whitish, firm masses were noted in the spleen. The liver was mottled, but no mass was observed. Other organs including the right kidney were grossly normal. The selected tissues were immediately fixed in 10% neutral formalin, and further histological procedures were performed, and because of former diagnosis of transitional cell carcinoma, the review was mainly focused on kidney. Abdominal mass was composed of renal tissues and neoplastic cells from kidney. Most of renal tissues were replaced with neoplastic cells, therefore, normal renal tissues showed severe trophy (Fig. 2). Neoplastic cells formed irregular sized tubular differentiation covered with chromophobic epithelium. This neoplastic epithelium had slightly eosinophilic scant cytoplasm, relatively uniform nuclei, and high mitotic figures (Fig. 3). Some neoplastic epithelial cells showed papillary projection in long ribbons or tubules. Many tubules contained necrotic epithelial debris in their lumens. Many tumor cells had great invasive tendency to adjacent connective tissue and capsule, therefore they formed arrested foci in perirenal fat tissue. Some tumor cells were located in blood vessels and/or lymphatic. Multifocal to diffuse massive necrosis and severe hemorrhage were existed in the mass. Moderate to strong, diffuse cytoplasmic vimentin expression was detected in neoplastic cells (Fig. 4). In addition, multifocal lymphocytic interstitial nephritis, thrombosis in blood vessels, and massive fibrosis also presented in requested mass. Based on second histological examination, the renal cell carcinoma was diagnosed.

DISCUSSION

Renal cell carcinoma is reported to originate from the epithelium of proximal convoluted tubules (Maxie, 1993; Crow *et al.*, 1995). Dogs with renal cell carcinoma tend to be presented with nonspecific general systemic clinical signs, such as anorexia, depression and weight loss (Militerno *et al.*, 2003; Kobayashi *et al.*, 2008), and nonspecific clinical signs may difficult to diagnose at early stages. Hematuria is observed in 10~33% of patients, and is rare without hemangioma or lesions including renal pelvis (Hammer and LaRue, 1995; Dernell *et al.*, 2001). The present case also be presented for a chronic (1-month history) weight-loss and anorexia. Although hematuria and severe abnormal results in blood tests and radiographs findings rendered to be easily diagnosed with renal mass, it also has become metastatic.

Dogs with primary renal tumors usually show normal blood tests results, especially in the unilateral tumors (Dernell *et al.*, 2001; Bennett, 2004). Anemia secondary to hematuria, polycythemia, neutrophilia, hypocalcemia, azotemia and occasionally increase in ALP and ALT may be presented (Petterino *et al.*, 2011). In the present case, anemia, hematuria and leukocytosis were observed. Anemia and leukocytosis were worsened during admission, which might be caused by long-term fluid therapy and inflammatory reaction to surgery.



Fig. 1: Lateral radiographic view in a dog diagnosed with renal cell carcinoma. The view of chest and abdomen revealed no metastases to the lung and a large mass in the kidney field.

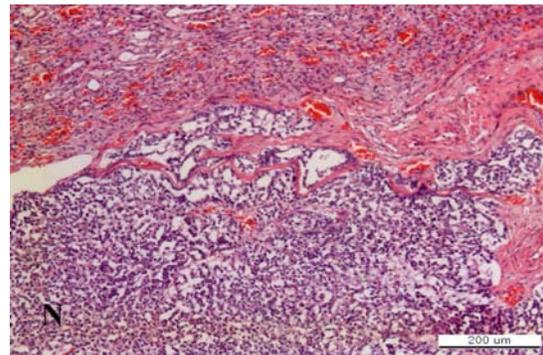


Fig. 2: Kidney in a dog diagnosed with renal cell carcinoma. Because of neoplasm (N), normal renal tissues (upper area) showed severe trophy (H&E, x100).

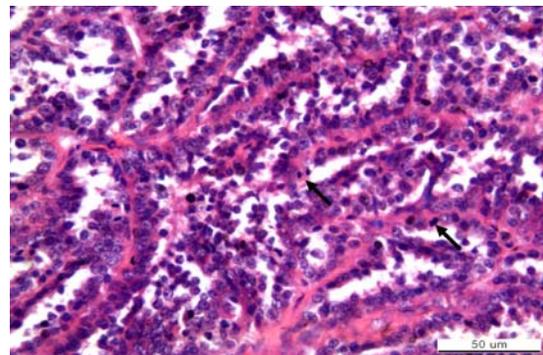


Fig. 3: Kidney in a dog diagnosed with renal cell carcinoma. Neoplastic cells had high mitotic figures (arrows). (H&E, x400).

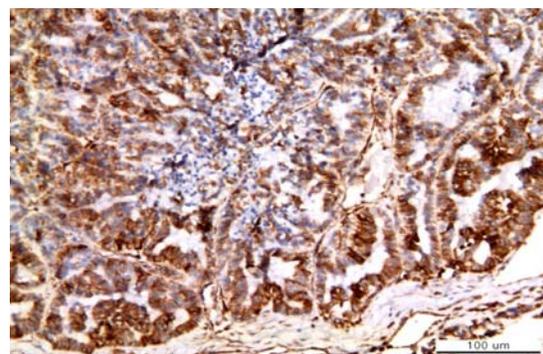


Fig. 4: Kidney in a dog diagnosed with renal cell carcinoma. Neoplastic epithelium expressed positive reaction for vimentin. (IHC, x200).

Comparing with middle-aged and geriatric dogs (average age: 8-year) are usually affected to the primary renal tumors (Bryan *et al.*, 2006), the present case was found in a young age (4-year), but some reports have been shown in dogs with renal cell carcinoma as young as 1-year of age (Maxie, 1993; Crow *et al.*, 1995).

Nephroureterectomy is indicated in cases of unilateral renal cell carcinoma where the contralateral kidney has a normal function without any gross metastases (Crow *et al.*, 1995). In the present case, although we did not absolutely sure none metastases, no suspected lesion in right kidney was observed in ultrasonographs. However, the lesion in left kidney was beyond our expectations, and metastasis to the spleen was cause of discontinuing of surgery.

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