

Case report- Renal cell carcinoma in a dog: Multimodal diagnosis and surgical therapy

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Abstract

Primary renal tumours are uncommon in dogs, accounting for less than 2% of all tumours. A six-year-old female German Shepherd dog was presented to the small animal surgery outpatient unit of Madras Veterinary College Teaching Hospital with a history of haematuria for the past one month. Radiography and ultrasonography of the abdomen revealed a space-occupying mass in the left kidney, and FNAC revealed as renal cell carcinoma. Contrast Computed tomography (CT) of the abdomen was performed to evaluate its function and invasiveness of the tumour. Since the mass was in the left kidney, unilateral nephrectomy was performed through midventral approach. During the follow-up, the dog died 3 months after surgery.

Keywords: Computed tomography, Dog, Nephrectomy, Renal cell carcinoma, Ultrasonography

Highlights

- Contrast Computed tomography was useful to evaluate the invasiveness of the tumour and the function of the kidneys.
- For unilateral renal cell carcinoma, nephrectomy is the treatment of choice.
- Histopathology helps in the confirmatory diagnosis of renal cell carcinoma.

The prevalence of primary renal neoplasia is estimated to be 0.3% to 1.5% of all canine neoplasia (Meuten and Meuten, 2016). German Shepherd dogs are known to be predisposed to renal tumours (Kwon *et al.*, 2018). Renal cell carcinomas (known as renal tubular carcinoma and renal tubular adenocarcinoma) and nephroblastoma are the most important types of primary renal tumours in veterinary medicine (Lucke and Kelly, 1976). Unilateral nephrectomy is the treatment for affected animals if the contralateral kidney is functional. The present paper describes the diagnostic approach of unilateral renal cell carcinoma and its successful surgical management.

A 6-year-old female German Shepherd dog was presented to the small animal surgery

outpatient unit of Madras Veterinary College Teaching Hospital, Chennai with a history of haematuria for one month. Clinical examination revealed all the vital parameters were within the normal range. Haemato-biochemical parameters showed thrombocytopaenia and hypercalcemia.

Abdominal radiograph revealed a large oval mass in the area of the left kidney (Fig. 1). On ultrasonography, a heterogenous mass was visualized in the left kidney measuring about 9 cm in length and 7 cm in height (Fig. 2). Ultrasound guided FNAC was suggestive of renal cell carcinoma.

Contrast Computed tomography of the abdomen was performed under general anaesthesia using third generation, 16 slice multi row detector CT machine. Contrast CT was

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Fig. 1. Abdominal lateral radiograph indicating space-occupying mass in the renal area

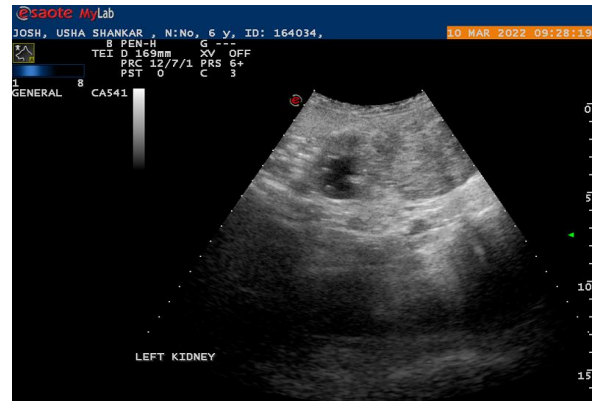


Fig. 2. Ultrasonography indicating a heterogenous mass in the left renal area



Fig. 3. Coronal view- indicating heterogeneous hypoattenuating mass in the left kidney

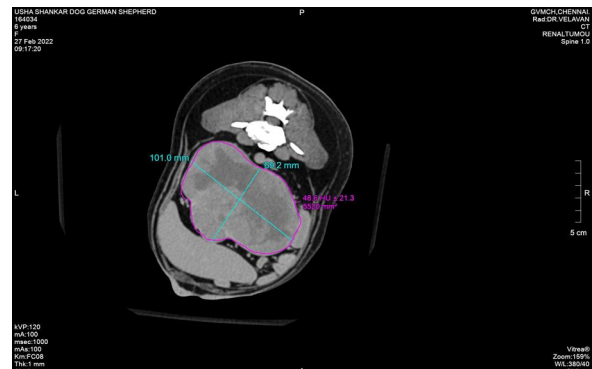


Fig. 4. Transverse view – indicating the size of the tumour

performed by injecting intravenous non-ionic contrast agent Iomeprol-400 at a dose of 300 mg IV/kg body weight through cephalic vein. The left kidney appeared abnormal in size and had a hypoattenuating mass with heterogenous enhancement and occupied an area of about 5227 mm.sq with dimensions of 77.8 mm × 100.3 mm, respectively (Fig. 4). The mass was also pushing the abdominal aorta towards right. Following contrast administration, the left kidney showed minimal cortical enhancement in the cranial pole alone, indicating functional loss of remaining renal parenchyma (Fig. 3). Metastatic nodules were seen in lung lobes.

On the day of surgery, the animal was premedicated with Inj. butorphanol @ 0.2 mg/kg I/V and Inj. diazepam @ 0.25 mg/kg I/V. Anaesthesia was induced with Inj. propofol @ 3 mg/kg I/V and maintained with isoflurane

2% inhalant anaesthesia.

Animal under dorsal recumbency, unilateral nephrectomy of left kidney was performed (Fig. 5). The left ureter was ligated close to urinary bladder as much as possible and transected. Ovariohysterectomy was also performed as per the standard procedure. The patient showed normal condition at the follow up. The dog died 3 months after surgery. Samples were collected for histopathology in 10% neutral buffered formalin. On histopathology, the neoplastic cells were arranged in an irregular elongated tubular pattern, and mild to moderate stroma was seen. Vesicular hyperchromatic, pleomorphic nuclei and light eosinophilic cytoplasm were observed (Fig. 6). Scanty mitotic figures were seen.

This report describes the successful management of a unilateral renal cell carcinoma

RCC-diagnosis and therapy

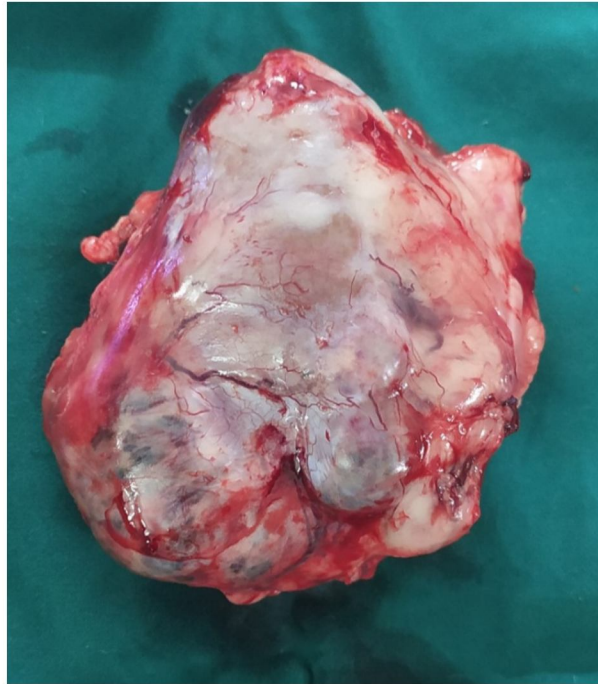


Fig. 5. Exteriorised nodular renal mass

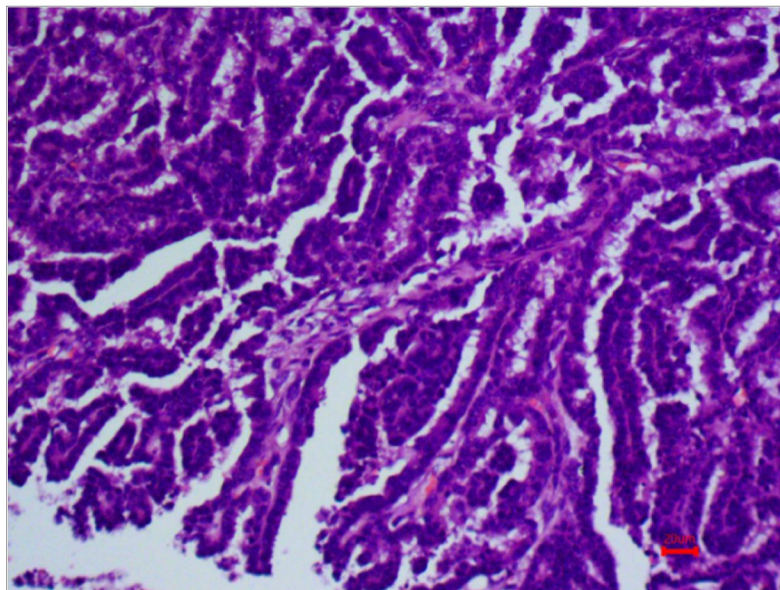


Fig. 6. Neoplastic cells were arranged in irregular elongated tubular pattern 100X, HE

in a German Shepherd dog with surgical removal. Primary renal tumours are uncommon in dogs, accounting for less than 2% of all canine tumours (Bennett, 2004). Renal tubular carcinoma mostly occurs in middle-aged or older dogs, and breed predilection does not exist (Jang *et al.*, 2000) which coincides with our case, since the dog is 6 years old. In this study, renal cell carcinoma occurred to have heterogenous enhancement and unilateral renal involvement, and vessel enhancement in the corticomedullary phase. This finding is similar to previous reports on contrast enhanced computed tomography findings of canine renal tumours (Tanaka *et al.*, 2019). CT scanning in this case helps to identify the evidence of metastasis and adhesion to surrounding structures in more detail which correlates with the findings of Carvalho *et al.* (2017).

Unilateral renal involvement and malignancy observed in this present case were also reported to be more common in dogs with renal neoplasm (Bryan *et al.*, 2006).

REFERENCES

- Bennett F, 2004. Unilateral renal cell carcinoma in a Labrador retriever. *Can Vet J*, 45(10): 860-862
- Bryan JN, Henry CJ, Turnquist SE, Tyler JW, Liptak JM *et al.*, 2006. Primary renal neoplasia of dogs. *J Vet Intern Med*, 20(5): 1150-1160, doi: 10.1892/0891-6640(2006)20[1155:prnod]2.0.co;2
- Carvalho S, Stoll AL, Priestnall SL, Suarez Bonnet A, Rassnick K *et al.*, 2017. Retrospective evaluation of COX 2 expression, histological and clinical factors as prognostic indicators in dogs with renal cell carcinomas undergoing nephrectomy. *Vet Comp Oncol*, 15(4): 1280-1294, doi: 10.1111/vco.12264
- Edmondson EF, Hess AM and Powers BE, 2015. Prognostic significance of histologic features in canine renal cell carcinomas: 70 nephrectomies. *Vet Pathol*, 52(2): 260-268, doi: 10.1177/0300985814533803
- Fulkerson CM and Knapp DW, 2019. Tumors of the Urinary System. Withrow and MacEwen's Small Animal Clinical Oncology, 6th edn. Elsevier, pp 645-656, doi: 10.1016/b978-0-323-59496-7.00030-x
- Jang KH, Jang HS, Song CH, Kang WM, Park KD *et al.*, 2000. Renal carcinoma in a dog. *J Vet Clin Med*, 17: 270-274
- Kwon YJ, Suh GH, Kang SS and Kim HJ, 2018. Successful management of proteinuria and systemic hypertension in a dog with renal cell carcinoma with surgery, telmisartan, and amlodipine. *Can Vet J*, 59(7): 759
- Lucke VM and Kelly DF, 1976. Renal carcinoma in the dog. *Vet Pathol*, 13(4): 264-276, doi: 10.1177/030098587601300403
- Meuten DJ and Meuten TLK, 2016. Tumors of the urinary system. In Book: Tumors in domestic animals, pp 632-688, doi: 10.1002/9781119181200.ch15
- Tanaka T, Akiyoshi H, Nishida H, Mie K, Lin LS *et al.*, 2019. Contrast-enhanced computed tomography findings of canine primary renal tumors including renal cell carcinoma, lymphoma, and hemangiosarcoma. *PLoS One*, 14(11): e225211, doi: 10.1371/journal.pone.0225211

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