Small

POSTMORTEM CT & AUTOPSY OF A DOG:

DID THE DOG WATCHER DO IT?

Adam W. Stern,[1] Patricia Mendoza,[2] Robson F. Giglio.[2]

[1] Department of Comparative, Diagnostic and Population Medicine

[2] Department of Small Animal Clinical Sciences

College of Veterinary Medicine, University of Florida

adamstern@ufl.edu

C&T No. 5828

The owner of an 11-year-old, castrated male, Havanese dog went away on vacation and hired an individual to watch the family dog while he was away. The dog had a recent history of being diagnosed with renal disease but was otherwise doing well.

Upon returning from vacation a few days later, the dog was lethargic, anorexic, vomiting, and possibly 'blind' in one eye. The dog was brought to a veterinarian and was treated using an unknown protocol for renal failure; however, no response to therapy was observed. Humane euthanasia was elected. The owner was concerned that the individual watching the dog had done something cruel to the dog while the owner was away.

We were requested to perform a forensic autopsy in order to determine the cause of this dog's renal disease and determine if the circumstances surrounding this dog's clinical signs could have been an act of cruelty by the dog watcher. The general approach of a death investigation in a case of suspected abuse of a dog would include performing a postmortem imaging study, an autopsy including both external and internal examination, and histopathology. We routinely collected formalin fixed tissues, fresh tissues, and bodily fluid in case ancillary testing such as serology, molecular diagnostics, and/or analytical chemistry were required.

Forensic imaging studies including radiography, ultrasonography, computed tomography and magnetic resonance imaging are useful tools in forensic evaluation of live or deceased individuals.[2]

In this case we began with a full body postmortem computed tomography (PMCT) as this is a valuable tool to assess for skeletal trauma but is also a method we can use to assess for disease in all organ systems; in this case the urinary system. The dog was positioned in sternal recumbency and a helical CT (Toshiba Aquillion Prime 160-slice CT) volume was obtained using 2 mm slice thickness. Multiplanar reformatted images were generated using soft tissue, lung bone algorithms. In the abdomen a number of findings were observed including a large right kidney and a small left kidney (Figure 1), mild retroperitoneal and moderate peritoneal effusion, a large ill-defined hypoattenuating region in the right division of the liver, with concurrent renal and hepatic lymphadenopathy. In the thorax, moderate bilateral pleural effusion was present. Additional findings included mild bilateral non-destructive rhinitis, mineralization of the intervertebral disc (T7-T8), and missing teeth. No fractures of the skull, long bones, or ribs were identified. The patient showed a thin body condition.

Given the marked renal asymmetry, peritoneal and retroperitoneal effusion and regional lymphadenopathy, the primary differential diagnosis for the renal changes was a malignant process such as renal carcinoma and less likely lymphoma. Alternatively, the renal enlargement could have represented an enlarged compensatory right kidney and a small degenerative left kidney secondary to chronic kidney disease. Differential diagnoses for the hypoattenuating hepatic region included primary, metastatic or multicentric neoplasia, infarct and nodular hyperplasia/ regeneration.

After consultation with the radiologist, we continued our investigation by performing a complete autopsy. The dog was underweight with easily palpable ribs, spinous processes, hips, and spine of the left and right scapula. There was decreased musculature over the entire body. There was no external evidence of bruising or swelling.

There was moderate peritoneal effusion and the right kidney was markedly enlarged, measured 7 cm x 5 cm x 9 cm and weighed 89.2 g (Figure 2). The left kidney was small, measured 3.5 cm x 2 cm x 2 cm and weighed 13 g. There was marked thickening of the right renal capsule and the right kidney and the retroperitoneum was expanded by tan to white tissue which was firm on palpation. On the cut section of the right kidney, there were multiple dark red and triangular/pyramidal foci. There was lack of distinction between the cortex and medulla in multiple regions of the kidney. The outer cortical surface of the left kidney was multifocally

retracted with foci of white discoloration within the cortex and medulla. Within the thorax was mild pleural effusion. The skull was thoroughly examined and no fractures were identified. There was no haemorrhage within the cranium and the brain was bilaterally symmetrical. There were no retrobulbar fractures or areas of haemorrhage. Overall, the necropsy findings were in agreement with PMCT findings.

The next step was processing the formalin fixed tissues for histopathology. We examined all major organs systems, gastrointestinal system, endocrine system (adrenal glands, thyroid glands, pancreas, and pituitary gland) and the brain. Neoplastic round cells with a large N:C ratio were identified within both kidneys, liver, lymph nodes, and diaphragm and were consistent with lymphoma. Immunohistochemistry to determine cell type (T cell vs B cell) was not performed. Additionally, moderate membranous glomerulonephropathy was identified within both kidneys. There were no systemic changes of chronic renal failure including gastric mineralization, parathyroid hyperplasia, or pulmonary mineralization.

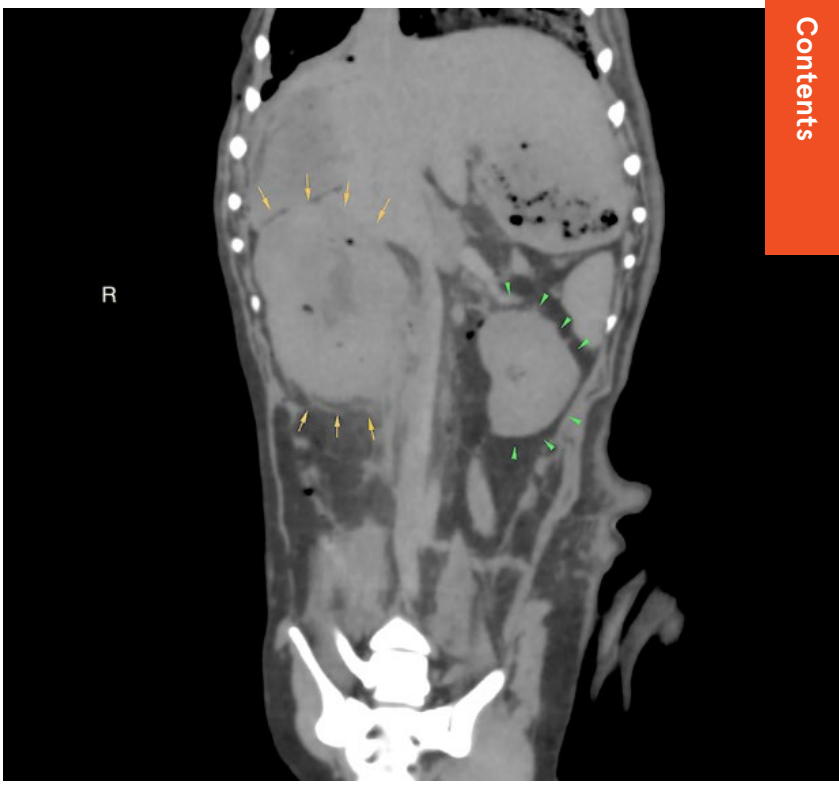

Figure 1. Marked asymmetry between the right kidney (yellow arrows) and left kidney (green arrowheads)

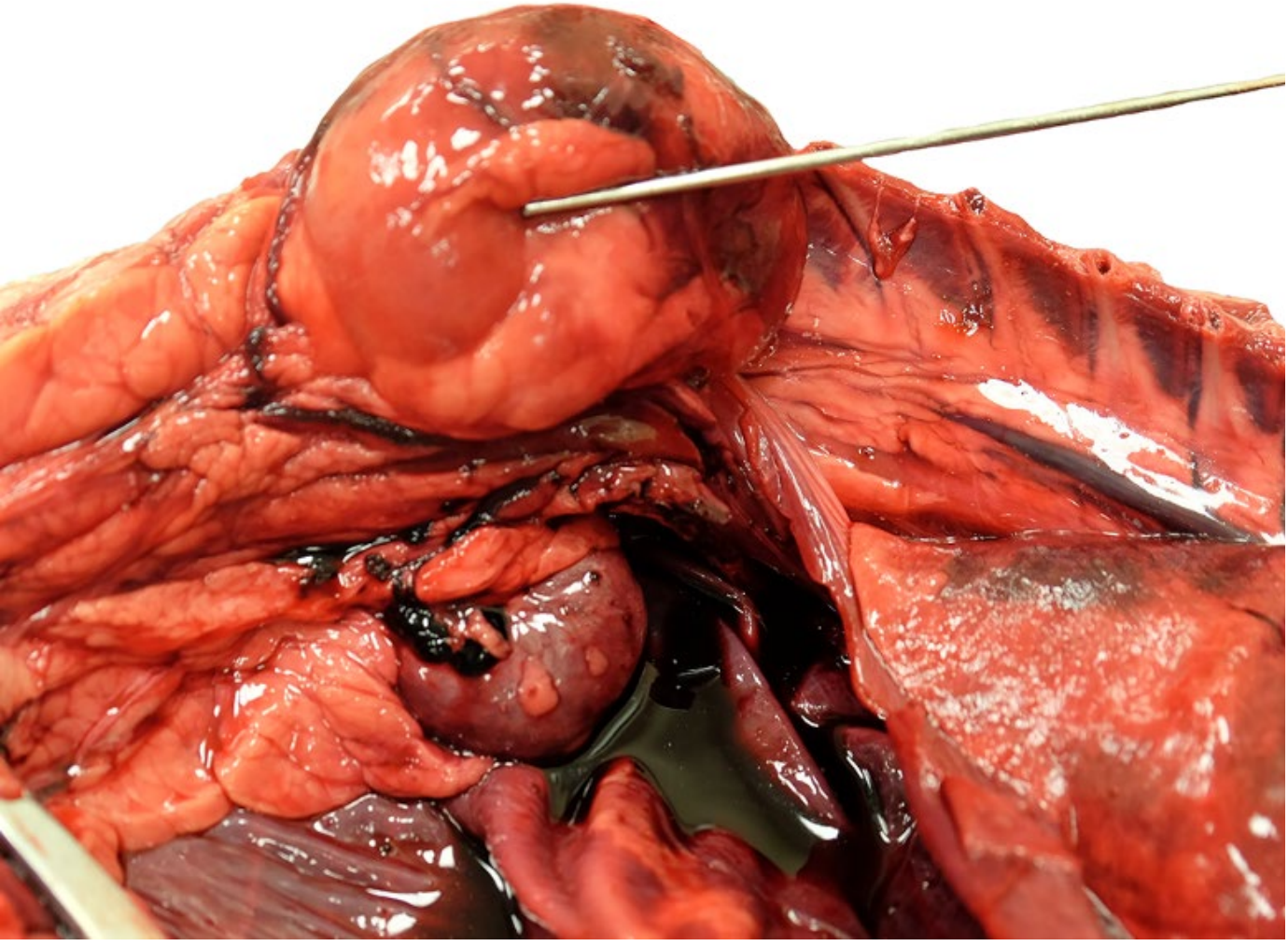

Figure 2. The right kidney is enlarged and the left kidney is small. Head is to the right side of the image

Review of the PMCT and autopsy findings are supportive that this dog's clinical signs were most likely attributed to a neoplastic origin and with histopathology the diagnosis of lymphoma was made. Primary renal lymphoma is uncommon and only a few reports of this variant of lymphoma are reported in the literature.[1] There was no evidence to support non-accidental trauma nor was there evidence of acute renal disease from potential poisoning (for example ethylene glycol). In this case, we were happy to confirm this dog succumbed to an entirely natural process.

This case presents a not so uncommon scenario where animals are presented to our forensic pathology service with suspicious circumstances involving a dog watcher, dog walker, or groomer. As we cannot predict what we will find in each case we often will begin with PMCT or another imaging modality, as some cases will in fact have skeletal and soft tissue injuries supportive of non-accidental injury. We found this to be an interesting case highlighting the use of PMCT and autopsy results from our forensic pathology service.

References:

1. Breshears, MA, Meinkoth JH, Buoncompagni S, Stern AW, Thomason JD. *Pathology in Practice.* J Am Vet Med Assoc 2011;238:167-169.
2. Watson E, Heng HG. Forensic radiology and imaging for veterinary radiologists. *Vet Radiol Ultrasound* 2017;58:245-258.

Source of funding: The authors received no financial support for the research, authorship, and/or publication of this article.

Conflicts of interest: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Acknowledgements: None

Comment from Mark Krockenberger

Professor of Veterinary Pathology, Associate Head of Veterinary Clinical Sciences, Registered Specialist Veterinary Pathologist

sydney.edu.au/vetscience/vpds

Post mortem imaging can certainly be a valuable adjunct to the necropsy examination of a dead animal. Of course, it can be extremely valuable in cases of suspected cruelty but it can also be of significant value in many other settings.

Diagnostic imaging allows much more detailed examination of the skeleton than is generally easily possible at necropsy examination. The pathologist is hampered to a much greater extent than the radiologist by the soft tissues of the body, in the examination of the skeleton. Imaging of soft tissues can also be valuable. There are artefacts created post mortem even evident radiologically, but these are predominantly soft tissue. It is worth being very vigilant to artefact, just as the pathologist is vigilant to post mortem artefact on gross examination at necropsy. The best-case investigation outcomes are where the imaging department have close interactions with the pathology department, building over time an appreciation of post mortem artefacts. This requires a bit of finesse on the part of the pathologist and emergence from the dark domain of the imaging department for the diagnostic imagers.

At the University of Sydney, for the past 6 years, a part of the final year DVM pathology experience is a joint session called pathology-imaging rounds where students, pathologists and diagnostic imagers explore cases from the imaging point of view and from the gross and microscopic pathology point of view. These are usually cases that are of interest to both disciplines for different reasons. Both disciplines explore primarily structural disease, so it makes a lot of sense to bring them together wherever possible.