Chronic Cough in a 3-Year-Old Labrador Retriever

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Buddy, a 3-year-old castrated Labrador retriever, was presented for a 2-week history of chronic, intermittent coughing.

History

Buddy, who was presented in February, lived in a rural environment about 50 km (31 miles) north of Toronto, Ontario, Canada, with 1 other dog and 1 cat in the household. Neither of the other animals showed signs of illness. Vaccinations were up-to-date. The dog had previously been on monthly heartworm prevention (ivermectin–pyrantel) from May through October. Buddy had been receiving corticosteroids (prednisone, 1.0 mg/kg PO once a day) to treat atopy for 1 month prior to presentation. His appetite and general demeanor were normal. No exercise intolerance or dyspnea was reported.

Examination

Buddy appeared bright and alert and was moderately overweight. A nonproductive cough could be elicited on tracheal palpation. Temperature, pulse, and respiratory rate were normal; other than the cough, no abnormalities were detected on physical examination.

Diagnostics

A fresh fecal sample was submitted just before the appointment. A zinc sulfate centrifugal flotation was pursued to detect any possible pulmonary capillarid infection. Eggs of *Trichuris vulpis* and *Alaria* spp and several nematode larvae were detected on the centrifugal flotation examination (***Figure 1***, next page). Identification of the nematode larvae was not possible owing to the effects of the osmotic damage caused by the high specific gravity flotation media.

A fecal sedimentation test was then performed, and a Baermann examination was set up in an attempt to

▲First-stage larva detected on zinc sulfate centrifugal fecal flotation. The osmotic damage from the high specific gravity flotation media is too severe to allow identification (original magnification 20× objective).

ASK YOURSELF

- In cases of suspected lungworm infection in North America, which fecal examination diagnostic methods should be used to detect the various lungworm species infecting dogs?

obtain undamaged larvae. All larvae recovered on sedimentation were dead and too degenerated to identify. The larvae were 235 to 245 microns in length, and the anterior end was bluntly rounded (***Figure 2***). The results of the Baermann examination obtained the following day were negative. CBC and serum chemistry profile were within normal limits. Thoracic radiographs revealed a diffuse pulmonary bronchointerstitial pattern.

A transtracheal wash sample was obtained. The sample was highly cellular with a predominance of eosinophils. Moderate numbers of neutrophils; small numbers of macrophages, lymphocytes, and plasma cells; and rare mast cells were also present. A moderate number of larvated nematode eggs and larvae were recovered. Gentle pressure on the coverslip induced the release of many of the larvae from the eggs. The larvae were similar in size to those recovered from the fecal sedimentation but were motile, and the morphology could be evaluated in greater detail (***Figure 3***). The larvae had a bluntly rounded anterior end, long rhabditiform esophagus (over half the total length of the larvae), and a slight kink in the tail. The size and morphology were consistent with first-stage larvae of *Filaroides hirthi, Filaroides milksi,* and *Oslerus osleri* (formerly *Filaroides osleri*).

A presumptive diagnosis of *Filaroides hirthi* infection was made based on clinical signs and history of therapy with an immunosuppressive drug (ie, prednisone).

Diagnosis

Presumptive *F hirthi* infection

Treatment and Outcome

Buddy was treated with fenbendazole (50 mg/kg PO once a day for 14 days) and gradually weaned off prednisone therapy. Clinical signs resolved within the 2-week treatment period. Follow-up treatment with milbemycin oxime (0.5 mg/kg PO once monthly for 4 months) was administered to control the unrelated *T vulpis* infection.

Discussion

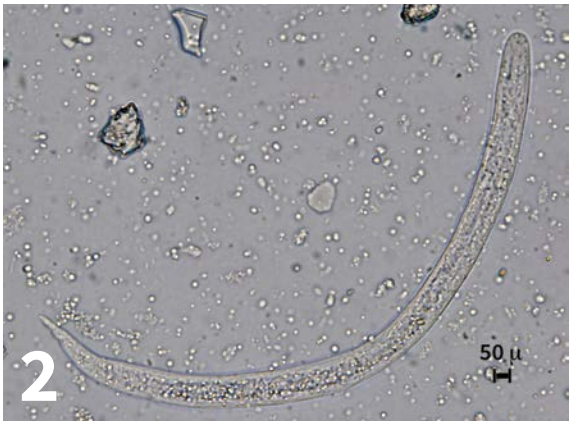
F hirthi is a metastrongyloid that infects the bronchioles and lung parenchyma of dogs. This infection is more commonly associated with research laboratory beagle colonies; diagnoses in client-owned animals are relatively rare.[1] Infections are usually subclinical; however, life-threatening cases occur if there is immunosuppression from concurrent disease processes (eg, distemper, neoplasia, severe trauma) or therapy (long-term corticosteroid treatment).[2-8] Because infection is usually subclinical and diagnosis is difficult, prevalence of infection may be underestimated. Unlike the situation with most other metastrongyloids, the

life cycle of *F hirthi* is direct; dogs become infected through ingestion of first-stage larvae passed in fresh feces or sputum from infected dogs.[9] Severity of infection in immunosuppressed dogs is likely related to autoinfection leading to hyperinfection.[1]

Failure to detect first-stage larvae by Baermann examination is typical of *F hirthi* infection in dogs. Detection by the Baermann method requires larvae to be alive and active; larvae of *F hirthi* and the closely related *O osleri* and *F milksi* lack sufficient vigor to exit the feces and be detected by Baermann examination.[9] Centrifugal flotation using zinc sulfate is more reliable than the Baermann method for detecting larvae in feces; however, false negatives are common and morphology may be damaged, preventing identification (as in this case).[1] Detection of larvae and larvated eggs in sputum or transtracheal wash samples is the diagnostic method of choice. Morphologically, the larvae of *F hirthi* closely resemble those of *O osleri* and *F milksi*.[1] Definitive diagnosis of *O osleri* infection is made by observing wart-like nodules (containing the adult worms) clustered at the bifurcation of the trachea via bronchoscopy.[9] Detection of larvae consistent with *F hirthi/O osleri* and the absence of wart-like nodules at the bifurcation would indicate *F hirthi* infection.

The client refused consent for bronchoscopy for economic reasons and because of the strong positive clinical response to fenbendazole therapy. *F hirthi,* the most likely possibility in this case, remains a presumptive diagnosis based on the history of corticosteroid treatment.

Reports of *F milksi* infection in dogs are rare, and the role it plays (if any) in cases such as this remains unknown. Clinical disease from *O osleri* infection in dogs usually occurs in animals younger than the dog in this case.[10] Other nematode larvae detected in the feces of dogs include *Strongyloides stercoralis, Crenosoma vulpis*, and *Angiostrongylus vasorum*.[11] The larvae of *S stercoralis* and *C vulpis* have simple straight tails in



▲ Dead and degenerating first-stage larva recovered by fecal sedimentation. Larva is about 245 microns in length and has a bluntly rounded anterior end (original magnification 40× objective).

▲ Live, motile first-stage larva detected in the transtracheal wash sample. Note the bluntly rounded anterior end, a long esophagus (over half the length of the larva), and the slight kink in the tail (original magnification 20× objective).

F hirthi is a metastrongyloid that infects the bronchioles and lung parenchyma of dogs.

contrast to the kinked tails of *F hirthi*.[11] The tails of *A vasorum* are also kinked but differ from *F hirthi* in that they contain a dorsal spine.[11]

Fenbendazole (50 mg/kg PO once a day for 14–21 days or 100 mg/kg PO once a day for 7 days) has been used successfully to treat *F hirthi* infection in dogs.[1] Albendazole and ivermectin have also been used to treat dogs infected with *F hirthi*.[1,7]

DID YOU ANSWER?

- Baermann examination (*Angiostrongylus vasorum* L1, *Crenosoma vulpis* L1), centrifugal flotation (*Eucoleus aerophilus* eggs, *Filaroides hirthi* L1, *Filaroides milksi* L1, *Oslerus osleri* L1), and fecal sedimentation (*Paragonimus kellicotti* eggs).

References

1. Conboy G. Helminth parasites of the canine and feline respiratory tracts. *Vet Clin N Am Small Anim Pract.* 2009;39(6):1109-1126.
2. August JR, Powers RD, Bailey WS, Diamond DL. *Filaroides hirthi* in a dog: Fatal hyperinfection suggestive of autoinfection. *JAVMA*. 1980; 176(4):331-334.
3. Carrasco L, Hervás J, Gómez-Villamandos JC, de Lara M, Sierra MA. Massive *Filaroides hirthi* infestation associated with canine distemper in a puppy. *Vet Rec*. 1997;140(3):72-73.
4. Craig TM, Brown TW, Shefstad DK, Williams GD. Fatal *Filaroides* infection in a dog. *JAVMA*. 1978;172(9):1096-1098.
5. Genta RM, Schad GA. *Filaroides hirthi*: Hyperinfective lungworm infection in immunosuppressed dogs. *Vet Pathol.* 1984;21(3):349-354.
6. Spencer A, Rushton B, Munro H. *Filaroides hirthi* in a British bred beagle dog. *Vet Rec.* 1985;117(1):8-10.
7. Pinckney RD, Studer AD, Genta RM. *Filaroides hirthi* infection in two related dogs. *JAVMA.* 1988;193(10):1287-1288.
8. Valentine BA, Georgi ME. *Filaroides hirthi* hyperinfection associated with adrenal cortical carcinoma in a dog. *J Comp Path.* 1987;97(2):221-225.
9. Georgi JR, Georgi ME. In: Georgi JR, Georgi ME, eds. *Canine Clinical Parasitology.* Philadelphia, PA: Lea & Febiger; 1991:188-193.
10. Yao C, O'Toole D, Driscoll M, et al. *Filaroides osleri* (*Oslerus osleri*): Two case reports and a review of canid infections in North America. *Vet Parasitol.* 2011;179(1-3):123-129.
11. Zajac AM, Conboy GA. Fecal examination for the diagnosis of parasitism. In: Zajac AM, Conboy GA, eds. *Veterinary Clinical Parasitology.* 8th ed. Ames, IA: Wiley-Blackwell; 2012:14-28,67-71.