

Feline Heartworm Disease

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Case Presentation

A 7 year old, male castrated, domestic shorthair presented through the Columbus Veterinary Emergency Service for evaluation of an acute onset of dyspnea and one episode of either hemoptysis or hematemesis. He was healthy prior to presentation except for a chronic, intermittent cough suspected to be asthmatic in origin. He was kept strictly indoors and was current on all vaccinations.

On physical examination, a grade 4/6, right hemithorax, systolic murmur and increased bronchovesicular sounds associated with tachypnea were detected. Thoracic radiographs (Figure 1) revealed a focal, well-defined alveolar infiltrate in the dorsal aspect of the right caudal lung lobe. The left caudal lobar pulmonary artery was enlarged; the right caudal lobar pulmonary artery was difficult to evaluate due to the pulmonary infiltrate. There was also a moderate, diffuse increase in bronchointerstitial pulmonary markings. The heart appeared normal on the radiograph. A complete blood count and biochemical profile revealed a lymphopenia (324/ul) and hyperglycemia (180 mg/dl) attributed to stress. Thyroid hormone level was normal at 2.1 ug/dl. Echocardiography revealed heartworms in the right atrium, right ventricle and pulmonary artery (Figure 2). Tricuspid regurgitation was documented by color flow mapping and attributed to pulmonary hypertension and worms across the tricuspid valve.

Emergency treatment for pulmonary thromboembolism secondary to heartworm disease consisted of supplemental oxygen; terbutaline (0.01 mg/kg SQ TID), a beta-2 agonist used for its bronchodilating effects; dexamethasone (0.2 mg/kg IV) followed by prednisone (1 mg/kg PO BID) to decrease the inflammatory response; heparin (150 IU/kg SQ TID), to decrease clot propagation; and cephalothin (22 mg/kg IV TID) to prevent a secondary bacterial infection in the infarcted lung lobe. The patient improved over the next 36 hours.

On the second day of hospitalization, a median sternotomy was performed. The cat was pretreated with dexamethasone (0.15 mg/kg IV) and diphenhydramine (1 mg/kg IM) to prevent an anaphylactic response to traumatic transection of any worms. Surgical removal of 3 heartworms from the pulmonary arteries was accomplished through a right ventriculotomy. A right atriotomy was performed initially, but the heartworms had migrated out into the pulmonary arteries after anesthetic induction and were not able to be retrieved without the ventriculotomy. A 10 Fr chest tube was placed intraoperatively and removed 24 hours postoperatively. The cat was released from the hospital 48 hours after surgery on prednisone (1 mg/kg PO BID), long acting theophylline (25 mg/kg PO QD), and cefadroxil (22 mg/kg PO QD).

Despite clinical improvement at home, a moderate amount of pleural effusion was detected 1 week after release from the hospital. The etiology of the effusion was not determined but it resolved with home furosemide (1.2 mg/kg PO BID) therapy. Over the next 3 months, furosemide and prednisone therapy were

tapered. The cat continues to do great out 7 months from the initial thromboembolic event.

Feline Heartworm Disease

Feline heartworm disease has received considerable attention in veterinary professional publications and press releases over the last few years. As the diagnosis of heartworm disease is being sought after more aggressively and found more frequently, better diagnostic tests and means of protecting cats from infection are being developed. However, difficulties remain in the diagnosis and management of heartworm disease in cats. The significant differences between feline heartworm disease and its classical canine counterpart will be highlighted in the following discussion of the prevalence, clinical signs, diagnosis, treatment, and prevention of feline heartworm disease.

The prevalence of heartworm disease in cats approximates 5 - 20% of the canine prevalence in a particular geographic area. The worm burden in cats is usually low, as most have fewer than 4 worms and approximately one third of infections consist of same sex worms. Circulating microfilariae are found in less than < 20% of infected cats. Because the cat is an imperfect host for heartworms, the parasite has a shortened life span of approximately 2-3 years and a greater tendency for aberrant migration that can lead to central nervous system signs. Indoor-only cats are also susceptible to infection.

Many cats with heartworm disease may be asymptomatic; however, on the other end of the disease spectrum are cats that die suddenly. The clinical signs in cats with heartworm disease can be very nonspecific and may mimic other diseases such as feline asthma. Clinical signs include: chronic cough, shortness of breath, intermittent vomiting (usually unrelated to eating), anorexia, and weight loss. Physical examination may be unremarkable or reveal a right-sided systolic murmur from tricuspid regurgitation, a gallop, or abnormal lung sounds. Right-sided heart failure (ascites, jugular distension, hepatomegaly) is quite rare in cats.

The diagnosis of heartworm disease in cats is difficult due to the low worm burden and the usual occult status of infected cats. A recent Florida (Snyder et al. JAVMA vol 216, 2000) compared heartworm serum antigen and antibody test results using commercial laboratories and in-house heartworm test kits with necropsy findings in 330 animal shelter cats (19/330 affected). The antigen tests (Heska lab, Animal Diagnostics lab, DiroCHEK, and SNAP) were very specific (over 96%) and also somewhat sensitive (> 68% for all tests with DiroCHEK the highest at 79% sensitivity). The antigen tests' lack of better sensitivity is due to their inability to detect male and immature female worms. A positive antigen (or microfilaria) test means a cat has heartworm disease but a negative antigen (or microfilaria) test cannot be used to exclude heartworm disease.

Feline antibody tests (Heska Lab, Animal Diagnostics Lab, ASSURE, SoloStep) have traditionally been believed to be very sensitive but not very specific. Prior to the Florida study, a negative feline antibody test was considered to provide strong evidence a cat was not currently infected; however, this study showed that a negative heartworm antibody test should not be used to exclude heartworm disease. Particularly lacking in sensitivity was the Solo Step if

incubated for only 5 or 10 minutes; it detected only 6 of the 19 positive cats (32% sensitivity) after 5 minutes and 9/19 affected cats (47% sensitivity) after 10 minutes. The Heska Lab had the best sensitivity at 90% when using a 5 U/ml positive-cutpoint value. It is critical to remember that a positive feline antibody test reflects exposure and not necessarily current infection. A positive antibody test should be confirmed with an antigen test, radiographic findings, echocardiography, or angiography and should be supported by the presence of appropriate clinical signs.

Thoracic radiographs may help confirm the diagnosis and assess disease severity in infected cats. Enlargement of the caudal lobar (especially the right caudal lobar) pulmonary arteries is characteristic but rarely accompanied by a visible main pulmonary artery bulge. Pulmonary arteries with a width greater than 1.7 X the width of the ninth rib at their intersection are of concern (Figure 1). This is quite different than dogs where the pulmonary artery only needs to exceed the width of the ninth rib to raise concern and a main pulmonary artery bulge is often present. It is also important to remember that left-sided congestive heart failure can also cause pulmonary artery enlargement to this degree in cats. If the pulmonary artery enlargement is from left-sided congestive heart failure, one would expect to also appreciate left auricular enlargement on the VD projection and pulmonary infiltrates of cardiogenic pulmonary edema (Figure 3). Other radiographic findings of feline heartworm disease include bronchointerstitial or bronchial changes or alveolar infiltrates (especially of the right caudal lung lobe) characteristic for infarction. The cardiac silhouette is seldom enlarged. Angiography can be used to demonstrate heartworms in the pulmonary arteries; however, it is much more invasive than echocardiography and rarely pursued.

Echocardiography may provide visualization of the worms in the pulmonary artery branches (most often), main pulmonary artery, or right heart (Figure 2). Heartworms are seen more readily in cats than dogs due to the small pulmonary artery size in cats. In experienced hands, echocardiography may be the most sensitive test for feline heartworm disease as approximately 1.5 to 2 cms of the right caudal lobar artery and 0.5 cms of the left caudal lobar pulmonary artery can be visualized.

Treatment of heartworm disease in cats is controversial. Most cardiologists do not recommend adulticidal therapy with thiacetarsamide (Caparsolate, Rhone Merieux) due to severe toxic (fulminant noncardiogenic pulmonary edema) and pulmonary thromboembolic (associated with worm death) complications. Melarsomine (Immiticide, Rhone Merieux) is not approved for use in cats. Symptomatic cats are treated with prednisone (2 mg/kg/day PO tapering to 0.5 mg/kg QOD over 2-4 weeks) for mild to moderate respiratory signs and treated more aggressively (oxygen, heparin, bronchodilators) for severe thromboembolic complications (illustrated in the case presentation). Aspirin is not of benefit in cats with heartworm disease and may even be of detriment to the pulmonary parenchymal disease. In general, one allows time for spontaneous cure (worm death in <2 years) to occur and treats the complications as they arise. Affected cats should be put on preventative to prevent further infection.

For cats with severe symptoms or symptoms refractory to prednisone therapy, removal of the adult worms should be considered. This can be done surgically, as described above, with appropriate perioperative care and surgical expertise or by forceps or brush removal under fluoroscopic or echocardiographic guidance following right jugular venotomy. The major limitation of removal via jugular venotomy is the inability to retrieve worms in the pulmonary arteries and right ventricle

Monthly chemoprophylaxis can be accomplished with oral ivermectin (Heartgard for Cats, 24 ug/kg) or topical selamectin (Revolution, 6-12 mg/kg). Preventives can be given to heartworm antibody or antigen positive cats.



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