

Feline *Dirofilaria immitis* infection

Feline heartworm disease

Affected Animals:

Dogs and cats. Overall, cats are infected by heartworms much less commonly, even in areas in which heavily infected dogs are present. Male cats tend to be infected more commonly and have a larger worm burden than female cats, mostly because male cats spend more time roaming outside and have less resistance to infection than female cats. Cats that spend significant amounts of time outside, especially in mosquito-populated areas, are at increased risk for developing heartworm infection.

Overview:

Heartworm disease is a serious infection of the heart by parasitic worms called *Dirofilaria immitis*. It is not uncommon for infected cats to develop fatal respiratory and cardiac-related complications. Other cats, however, will have only minor symptoms such as vomiting, or no clinical signs at all.

Heartworm disease is spread by mosquitoes, which inject the larvae from the heartworm parasite into the skin when they bite. Thus, outdoor cats are at higher risk of infection, as they have an increased exposure to mosquitoes. Certain sections of the world have heavier populations of heartworm disease than others; cases of feline heartworm have been found most frequently in the eastern and mid-western states and in California.

Because of increased availability of tests to detect feline heartworms and a greater awareness of the disease, more veterinarians are able to diagnose the disease. Depending on the severity of the infection, there are a number of methods for treatment, including medications to alleviate the symptoms, drugs to kill the worms, and surgery.

Clinical Signs:

The clinical signs of feline heartworm infection can be acute or chronic. Pulmonary or central nervous system signs are seen more often in acute cases. Chronic signs may include episodic pulmonary disorders, gastrointestinal disorders, lethargy, or right-sided congestive heart failure. Nonspecific symptoms may include coughing, dyspnea, vomiting, anorexia, lethargy, and weight loss.

Some cats may exhibit no signs at all other than vomiting. Acute pulmonary thromboembolism resulting in severe dyspnea, weakness, vocalization of distress, and sudden death are not uncommon manifestations of heartworm disease in cats. Physical exam findings that could indicate heartworm disease include respiratory abnormalities, vomiting, heart murmur or gallop heart rhythms, syncope, and bloodwork suggestive of parasitic infection.

Symptoms:

Coughing and trouble breathing are the most common signs of chronic heartworm disease. Weakness, vomiting, and acute respiratory distress are also seen.

Description:

Dirofilaria immitis is a parasitic worm that usually develops within the right side of the heart or the adjoining large vessels. Infection is diagnosed more commonly in dogs, which appear to be more susceptible to infection than cats.

Infection is spread to cats when a mosquito bites the skin, injecting infective heartworm larvae into the bloodstream of the cat. Some of the heartworm larvae travel to the heart and develop into the adult stage. Unlike heartworm infections in the dog, cats have fewer infective offspring that mature into the adult stage, a lower number of adult worms at one time, and adults that live for a shorter period.

Heartworms can be a serious disease in cats and can result in sudden death, if for example, it leads to a blood clot that travels to the lungs. However, some cats will show minor symptoms, or no clinical signs at all. Symptoms, if present, are nonspecific for heartworm disease and require a thorough physical exam and testing to rule out other possible causes.

Heartworm infections are difficult to suspect, diagnose and treat in cats due to the relative absence of clinical signs in most cases, the unreliability of feline heartworm tests, and the high risk of serious side effects from treatment. A veterinarian in general practice may refer a cat suspected of having heartworms to a veterinary cardiologist for specialized testing and evaluation.

Treatment is controversial and generally reserved for cats suspected of having large worm infections with recurrent symptoms. Heartworm disease in some cats may be self-limiting, since the worms eventually die on their own, and thus the condition goes undetected. Heartworms should be considered in the list of diseases suspected of causing signs of respiratory distress, heart disease, and vomiting.

Preventive medication is available and recommended for cats living in geographic areas where the disease is prevalent, such as the eastern and Midwestern states, and California. Cats should be tested for heartworms prior to starting prevention. No adverse reactions to heartworm preventive treatments have been reported in cats.

Diagnosis:

Diagnosis can be difficult, because several other diseases can mimic the signs of heartworm disease. Disorders that exhibit similar symptoms include asthma; cardiomyopathy, or abnormality of the heart muscle; lungworm infection; lung fluke infection; and pleural effusion disorders, which cause fluid build-up in the space surrounding the lungs.

Routine bloodwork results may indicate a parasitic infection, but cannot positively identify heartworms. Thoracic radiographs, or chest x-rays, may help support the suspicion of heartworm infection, although abnormalities in the heart can be difficult to detect through this method. Definitive diagnosis of heartworm infection usually depends on the demonstration of adult heartworms by echocardiography, an ultrasound of the heart and vessels. Other techniques for positively identifying heartworms include pulmonary arteriography, a dye injection to visualize the lung arteries through x-rays, or detection of adult heartworm antigens via blood serology tests that detect adult heartworm antigens.

Echocardiograms cannot rule out heartworm disease definitively if there is a low worm count, but these tests are beneficial in ruling out other possible heart diseases. Cats need to be referred to a veterinary cardiologist for an echocardiogram or pulmonary arteriography.

Tests for the presence of heartworm offspring are available, but a negative test in no way rules out heartworm infection. Most feline heartworm cases have a low number of microfilaria, or offspring, that are present for a very limited time.

The most useful blood tests are for adult worm antigens, and moderately sensitive test kits are now available in many veterinary practices. The antigen detected is believed to come from the reproductive tract of female adult worms. If less than three females are present in a cat, the test results may be falsely negative, even though adult worms are present. However, a positive heartworm antigen test gives the most definitive evidence of feline heartworm infection.

Some laboratories also can perform an enzyme-linked immunosorbent assay, or ELISA, test for antibodies in the cat's blood sample. This test is better at picking up infections, but a positive test result does not indicate whether the worms are still living.

Prognosis:

Complications of the heart and respiratory system, such as a blood clot traveling to the lungs, carry a poor prognosis and commonly result in acute death. Other animals will show mild symptoms or no clinical signs at all. It can be very difficult to detect abnormalities in cats with heartworm infections, to accurately diagnose the disease, and to provide any form of treatment.

Transmission or Cause:

Infection with the *Dirofilaria immitis* parasite occurs when a mosquito that

previously has bitten an infected animal bites another animal, thereby injecting worm larvae into the new host. Infections in cats are much less common than in unprotected dogs in the same locale. Possible reasons include a mosquito preference to feed from dogs versus cats, a difference in exposure to infected mosquitoes, and a lower number of infective larvae developing into adults within the cat.

Treatment:

Cats diagnosed with heartworm disease that lack any clinical signs should not receive any form of adulticidal heartworm treatment, which kills adult worms, and can have fatal side effects in cats. Rather, the treatment of heartworm disease with adulticide medications should be reserved for those cats with persistent, serious clinical signs in which worm removal either is not an option, or it has failed to improve the signs of disease.

Some veterinary cardiologists have performed the surgical removal of adult worms from the infected cat's heart. This is not a common feline procedure, though, and it requires referral to an experienced surgeon with access to the proper equipment. Also, this surgery is usually attempted only in those animals in which an ultrasound has revealed a large number of worms.

Severely ill cats can be treated symptomatically to alleviate signs. Cage confinement, oxygen supplementation, anti-inflammatory drugs, and fluid therapy are commonly instituted. Once the cat is stable, heartworm treatment options can be considered.

Prevention:

Feline heartworm prevention is now commercially available through veterinarians as a once-a-month treatment. This preventive measure is recommended for all cats living in areas with high heartworm counts.