Beach Veterinary Clinic

Details of Heartworm Treatment

What are heartworms

Heartworms are parasites (*Dirofilaria immitis*) that live in the heart and the blood vessels of the lungs in dogs. Their life cycle is long and complex. Adult heartworms live in the heart and blood vessels of dogs and produce "babies" called microfilaria. These "baby" heartworms are carried through the blood stream. They can live in the dog for up to 2 years. When mosquitoes bite dogs not only do they drink the dog's blood, but the baby heartworms as well. Once inside the mosquito the baby heartworms further develop into what are called third stage larvae (L3). This development takes approximately two weeks. Once they are at the L3 stage they can infect other dogs. When the mosquito next bites a dog the L3 larvae infect the dog. The L3 larvae then spend the next 90-120 days traveling throughout the dog's body and further maturing. They finally take up residence in the dog's blood vessels of the lungs and the heart and become adult heartworms, producing babies of their own. The adult heartworms can live up to seven years. The average number of adult heartworms in infected dogs is 15, but can be many more in severe infections.

The real damage from heartworms comes from their living in the blood vessels and the heart. When they first reach the heart and lungs they are approximately 1-1.5 inches long. Female heartworms can grow to become 10.6 inches long. Male heartworms can grow to 6.7 inches long. The worms cause inflammation and plug up the blood vessels. They also increase the chance of the dog developing a clot that can block vessels of the lungs or other areas of the body. Exercise increases the amount of damage that the worms cause. This is why it is recommended that heartworm positive dogs be kept very quiet and not allowed to run around. The amount of exercise a dog does is more important than the number of worms present. The heartworms can also cause liver and kidney failure.

Dogs are the main host for heartworms, but cats, ferrets, and other wildlife can become infected. Cats are more resistant to heartworm infection than dogs. They generally do not become infected with as many heartworms as dogs. However, there is no heartworm treatment for cats (the treatment used for dogs will kill cats.)

Testing

All dogs should be tested for heartworms before being started on a preventative. This is because if they are positive there could be severe reactions to the preventative.

A simple blood test can be used to tell if your dog has heartworms. The test detects the female heartworm. The test will only be positive if the dog is infected with a female heartworm. Most dogs have both male and female worms and the test is therefore very accurate. Cats can sometimes have infections of just one or two worms, so they may not test positive even if they have worms. It takes nearly six months for the heartworm larvae to mature into adults once they are in the dog. So if your dog is less than six months old it does not need to be tested before being started on heartworm preventative.

Heartworm positive dogs will almost always die without treatment.

Exercise restriction

An extremely important part of heartworm treatment is exercise restriction. The more your dog exercises while infected with heartworms the worse the damage is to their lungs. Once treatment has begun and the worms begin to die they can plug up blood vessels. Exercise increases the blood flow in these vessels making the damage worse, possibly killing the dog.

Exercise restriction means that they should be confined to a crate or kennel or on a leash at all times! The crate or kennel should be just big enough for them to stand up and turn around in. The only time they should be let out is to go to the bathroom. When they are taken out they should be leash walked so they do not try to run or do too much. If you would like to take your dog out of the crate to spend more time with them make sure they are on a leash and all they do is sit or lay with you. This exercise restriction is extremely important because the more active the dog is the more likely they are to have serious side effects or die during treatment.

Pre-treatment with heartworm preventatives

The first step in treating a heartworm positive dog is to start them on one of the heartworm prevention medications (Tri-Heart Plus, Advantage Multi, Interceptor, Revolution, ect.) This is to kill the "baby" heartworms (microfilaria, L3, and the younger stages of L4 larvae). There are several reasons for doing this. First, killing the microfilaria will prevent the dog from infecting mosquitoes and spreading the disease to other dogs. Second, the adulticide drug (melarsamine) used to kill the adult heartworms does not kill heartworms less than four months old. If not treated these younger stages could grow up to become adult heartworms in your dog. These preventative drugs also weaken the adult heartworms and help decrease the chance of reactions when the adulticide is used.

The use of the preventatives in a heartworm positive dog is not without risk. The dying microfilaria and larvae can cause inflammation and occasionally severe reactions and death of the dog. Because of these possible reactions it is recommended that a heartworm positive dog undergoing this treatment be kept in the hospital the first day of treatment so they can be monitored for possible side effects (coughing, difficulty breathing, or death.)

Pre-treatment with doxycycline

Doxycycline is an antibiotic. Heartworms have bacteria (*Wolbachia*) that lives inside them and helps them. Doxycycline kills these bacteria and in turn weakens the heartworms. There is also evidence that doxycycline may lessen some of the other negative effects caused by the heartworms and the bacteria.

There are few negative side effects and risks associated with doxycycline. Some adverse effects can include vomiting and diarrhea.

Pre-treatment with prednisone

Prednisone is a steroid that can reduce inflammation. It is used before and during the adulticide treatment to help reduce inflammation caused by the dead and dying heartworms. This can help reduce some of the clinical signs seen during treatment.

There are few negative side effects and risks associated with prednisone. Some adverse effects are increased appetite, drinking, and urinating. Prednisone also decreases the immune system, so it could make pre-existing infections (bacterial or fungal) worse.

Treatment with melarsamine

Melarasamine (Immiticide) is the adulticide used to kill the adult heartworms. It will not kill heartworms less than four months old. Melarsamine is given by a deep intramuscular injection. Three injections are needed for treatment. The first one is followed one month later by two more injections given 24 hours apart.

There are significant risks involved with treating with melarsamine. When the heartworms are killed they are in the blood vessels and heart of the dog. As they die and start to decompose they can travel through the blood and plug blood vessels, mostly in the lungs. This is called pulmonary thromboembolism. Exercise restriction is critical before and for one month after treatment because as the dog exercises more blood is pumped into these blocked areas and that increases the damage. The heartworms can also release toxins as they decompose causing the dog's body to have life threatening reactions.

There is also risk with the drug itself; it is an arsenic based drug and can cause life threatening side effects. Side effects can include lung inflammation and edema and death. Signs of these side effects include tremors, unsteadiness, restlessness, panting, depression, not wanting to eat, fever, coughing, vomiting, and difficulty breathing. There can also be reactions at the injection site including selling, pain, tenderness and reluctance to move. Most of the injection site reactions are mild and go away.

Signs that a dog may show if having a negative reaction include fever, weakness, coughing, trouble breathing, blood from mouth or nose, and sudden death. Dogs with more severe heartworm infections are at a greater risk for these negative side effects. Following treatment death may be seen in 10-20% of dogs with severe infections.

Because of these possibly severe reactions it is recommended that dogs being treated for heartworm are hospitalized for the first day of treatment to monitor for possible reactions. Signs of reactions are usually seen within the first seven days of treatment, but can be seen as late as four weeks later.

Again, exercise restriction is very important to limit these negative side effects. Before and for one month after treatment the dog should not be allowed to do much exercising. This means that they should be confined to a crate or kennel or on a leash at all times! The crate or kennel should be just big enough for them to stand up and turn around in. The only time they should be let out is to go to the bathroom. When they are taken out they should be leash walked so they do not try to run or do too much. If you would like to spend more time with your dog you can take them out of the crate, but make sure they are on a leash and all they do is sit or lay with you. This exercise restriction is extremely important because the more active the dog is the more likely they are to have serious side effects or die during treatment.

Retesting

Retesting is important to make sure all the heartworms have been killed after treatment. Even after treatment it is possible for your dog to still be positive. This is because of the gap in the life cycle where no treatment can kill the heartworms. The preventatives can kill the baby heartworms up to 30 days after they infect the dog. The adulticide can only kill heartworms that are 4 months or older. This leaves a gap in the life cycle of approximately three months where the heartworms can not be killed. It is possible that during treatment these young heartworms could grow up and become adults.

Dogs should be retested for heartworms six months after the last dosage of the adulticide. The reason that you need to wait six months is that the adult worms take a while to completely decompose and go away after treatment. If you test before six months the dead worms could still cause a positive test.

If your dog tests positive after six months their case will be reviewed and a decision will be made whether or not to retreat.

Continued prevention

It is highly recommended that you continue with the heartworm preventative for your dog during and after treatment for heartworms. They can easily become re-infected after treatment and it is much easier, safer, and cheaper to prevent heartworm disease than to treat it. Although this area of North Dakota does not have a high incidence of heartworm disease, it is still possible. Also, if you and your dog travel outside this immediate area they could be at increased risk as some areas have a much higher incidence of the disease.

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