1971

Dermatophilosis in a Foal

Norman Cheville
Iowa State University

S. J. Sysewski
Iowa State University

J. L. Richard
Iowa State University

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Recommended Citation
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Heartworms In Iowa

By
Dr. J. H. Greve*

Canine heartworm infection, caused by *Dirofilaria immitis*, has made an alarming incursion into Iowa during the past 4 to 5 years. Review of clinical records at Iowa State University for the past 5 years show 46 cases of heartworm infection. Now it has gotten to the stage where veterinarians in some areas of Iowa are regularly encountering the disease and routinely check for its presence. Its presence in other northern states, such as Minnesota, Michigan, and Indiana, has been recognized for at least a decade. No longer can we rely upon the older thinking that heartworm disease is a condition limited to southern states.

Requests from Iowa veterinarians for specific newer information on heartworm diseases have been coming to us with increasing frequency. This has prompted the development of this brief review. Another motive for writing this review is to alert veterinarians to the rising prevalence of *D. immitis* in Iowa. We certainly would appreciate some response from Iowa veterinarians on their opinion about heartworm prevalence in their practice.

**Clinical picture**

Clinical signs are seen more often in out-of-doors breeds of dogs, since these dogs are more apt to come into contact with mosquitoes, the intermediate host of heartworm. In general, severity of the signs is directly correlated with the number of adult heartworms present in the right ventricle and pulmonary arterial tree. A few worms cause little or no clinical disease, whereas several worms (say 20 to 60) are associated with the typical syndrome of right-sided cardiac insufficiency—lack of stamina, dyspnea, and coughing. The dog may collapse after a short period of exercise. These signs are caused by interference with blood flow from the right heart into the lung field. This interference is brought about by interference with valvular function and by pulmonary hypertension caused by arteritis. The congestive heart failure caused by *Dirofilaria* may lead to the same sequelae as congestive heart failure from any other cause. Thus, hepatic degeneration, edemas, and cerebral hypoxia may be encountered.

In addition to this well-known "classical" picture, there is also a fulminating form called "hepatic failure syndrome." This is associated with heartworms in the postcava and backing up into the hepatic veins. Although the onset of this form may appear to be acute clinically, actually the events leading up to the final acute episode have been going on for several weeks. There is sudden weakness, anorexia, bilirubinuria, hemoglobinuria, ascites, and icterus. Death usually follows in a few days as a result of hepatic failure. Fortunately, only a small percentage of cases of heartworm fall into this category.

Another event associated with heartworm disease is embolism, especially of the lungs. Sudden development of severe cough and dyspnea, pyrexia, anorexia, and collapse signal pulmonary embolism. This occurs when worms living in the heart and pulmonary artery die and are flushed into the lungs, a common aftermath of therapy. Occasionally, moist to scaly dermatitis, especially on extremities.
such as ears and tip of the nose, develop during infections.

**Radiographic findings**

Ventrodorsal radiographs of the thorax will show the dilated right ventricular wall, pulmonary congestion, dilatation of the pulmonary artery, and pulmonary in farcts. If angiocardiography can be used, the emptying time of the right ventricle will be found to be increased. Also "pruning" and saccular dilatations of the smaller pulmonary arteries can be seen. These changes are diagnostic for heartworm disease.

**Diagnosis**

Finding of the microfilariae circulating in the blood and differentiating them from microfilariae of the harmless subcutaneous filarioid, *Dipetalonema reconditum*, is the principal method of diagnosis. Microfilariae can be found by many methods, such as the examination of a drop of blood, the examination of the supernatant serum above the buffy coat in a hematocrit tube, or in serum squeezed from a blood clot. In all these methods, the microfilariae are very active, making differentiation of the 2 species very difficult. We prefer the Knott's method, which kills and straightens the microfilariae for careful observation.

Much has been said about periodicity of microfilariae of heartworm. Accordingly, larger numbers of microfilariae can be found in the afternoon and night hours, but some microfilariae are circulating at all hours. We have found very few cases that could not be diagnosed by Knott's method using samples collected in mid-morning hours. However, the microfilaraemia would be increased by a factor of 5 to 15 or more in the evening. Given a choice, one should use a sample collected in the late afternoon rather than before noon. A more serious diagnostic problem is those cases which never show microfilaraemia, in spite of the presence of adults in the heart and pulmonary artery. Reasons for this disturbing phenomenon are not known; certainly only some cases can be explained by stating that the adults were as yet not fully developed.

**Treatment**

Before therapy is considered, complete evaluation of the dog's general condition is a must. Liver and kidney function tests, such as SGPT, BSP retention, BUN, and plasma sodium, are especially helpful. Corrections should be made before heartworm therapy if dysfunction is disclosed. Improvement of cardiac function by digoxin should be done if indicated. The number of circulating microfilariae is of no help in attempting to estimate how many adults might be in the heart.

When the dog has been properly prepared for treatment, the number of unsatisfactory results will be reduced. In some cases, digitalization and other supportive therapy may be all that the dog will tolerate. In other cases, attempts to eliminate the adults should be made. For this, intravenous organic arsenicals are the most widely used. Several protocols have been recommended, but an effective one recently reported is the injection of 0.45 mg thiacetarsamide/kg body weight twice daily for 2 days. If pulmonary embolism or other untoward reaction develops, therapy should be suspended immediately until it is deemed safe to resume. It should be stated that the use of dichlorvos is directly contraindicated when heartworm disease is present. Before this product is used for treatment of intestinal parasites, there should be reasonable assurance that the dog is not concurrently infected with *D. immitis*. Surgical methods that once were popular have given way to the chemotherapeutic approach.

About 6 weeks after the use of the adulticide, one should consider ridding the circulation of microfilariae. This is done by repeated oral doses of diethylcarbamazine or dithiazanine. If microfilariae persist after the approved course of treatment, it is likely that not all adults were killed by the arsenical, and an additional course of treatment is indicated.

**Summary**

The chief clinical signs of heartworm disease are those of chronic congestive
heart failure, although a fulminating "hepatic failure syndrome" may also occur. Diagnosis of heartworm disease is based upon identification of the microfilariae and by radiography. Treatment follows proper supportive therapy to prepare the dog for the rigors of the heartworm chemotherapeutics. With the recent incursion of heartworm disease into Iowa, veterinarians should be aware of this infection.

Are We Prepared for Change?

By E. W. Moss, D.V.M.*

The Agribusiness of the future will, through economic necessity, be quite different than it is today. The trend has been established and barring major world upheaval it will continue in the direction of fewer farm units of larger size and more specialized production with the emphasis on efficiency. The less productive areas of North America are moving along this path at faster rates than are the more fertile areas such as the Midwest, U.S.A. where the smaller unit can still survive due to the consistent high productivity of the land.

The services that supply these primary producers will have to change as well. We in the veterinary profession that concern ourselves with the food producing animals are in this category. The question arises;

*Dr. Moss is a 1970 graduate of the University of Saskatchewan, Saskatoon, Saskatchewan, Canada, and is currently an instructor in bovine clinical science, Iowa State University, Ames, Iowa.