



Diagnostic Exercise
From the Latin Comparative Pathology Group and the Davis-Thompson Foundation

Spirocercosis in a dog

Cristina Madelein Toledo¹, Kevin Berrios Fuentes¹, Junior Raxa Chavarría Rivera¹,
Ervin Antonio Cano Gómez¹, Mario Guillermo Rimoldi², Francisco Carvalho³

¹Universidad de Ciencias Comerciales, Managua, Nicaragua.

²Clemson Veterinary Diagnostic Center, Clemson University, SC, USA.

³Virginia-Maryland College of Veterinary Medicine, VA, USA.

Corresponding author: Cristina Toledo; cristina.toledo@ucc.edu.ni

Clinical History:

An adult female mixed breed dog was found in a local street market and taken to an animal rescue center. A hemogram on the day of arrival revealed anemia, lymphopenia, as well as thrombocytosis and neutrophilia. The patient received prophylactic treatment with praziquantel, febendazole, toltrazuril, and doxycycline, but died 6 days after arrival.

Gross Findings:

The carcass was found in a poor nutritional status, with depleted body fat stores and icteric mucous membranes. The liver was pale and tan (presumably hepatic lipidosis)(Fig. 1 A). Multiple encysted and free, red, thin nematodes were detected in the esophageal wall and caudal mediastinum (around the aorta and esophagus) associated with swelling of surrounding soft tissues (Fig. 1 B and C). Multiple areas with thickening and reddening of the thoracic aorta were detected (Fig. 1 D). Additionally, other nematode parasites (morphologically suggestive of *Ancylostoma* sp.) were detected in the small intestine (not illustrated).

Follow Up Questions:

- *Histologic Findings*
- *Morphologic diagnosis*
- *Most likely differential diagnosis*

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ANSWERS**Name of the disease**

Spirocercosis.

Morphologic diagnosis (Gross):

Granulomatous esophagitis, arteritis (aorta), pleuritis and bronchitis with intralesional nematodes.

Microscopic description:

Esophagus: The submucosa contains a fibrous nodule with irregular borders, composed of abundant cross-sections of nematodes and proteinaceous debris. The nodule is delimited by a thick layer of reactive fibrous connective tissue (Fig. 3).

Recognition of associated inflammatory infiltrates is limited due to autolytic changes and freezing/thawing artifacts.

Etiological agent description:

Female nematodes measure 54-80 mm and males 30-54 mm (6) with pseudocoelom, They had a smooth cuticle, polymyarian-coelomyarian musculature, and lateral chords of variable size. Some larvae contained homogeneous eosinophilic material in the pseudocoelom (Fig. 5), a characteristic feature of spirurid nematodes (7).

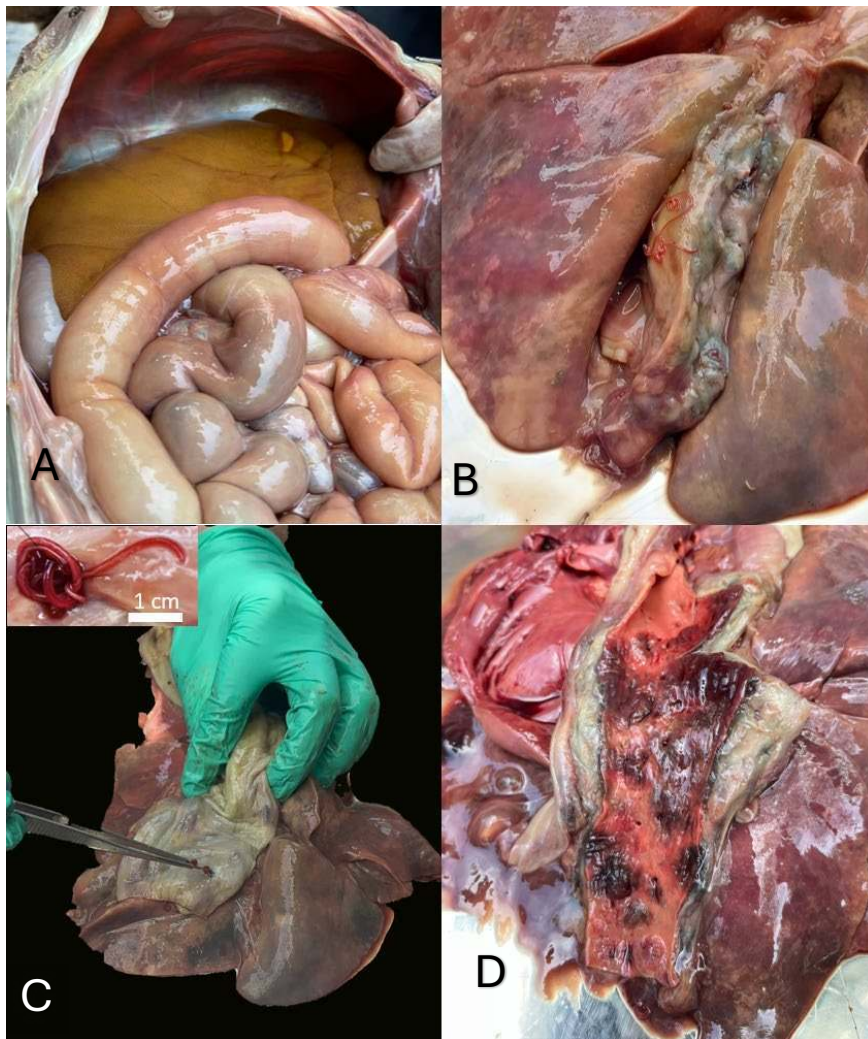
Spirocera Lupi**Taxonomy**Phylum: *Nematoda*Class: *Chromadorea*

Figure 1. A, presumptive severe hepatic lipidosis. B and C, adult *Spirocera lupi* parasites found in bronchi. D. Vasculitis and parasitic granulomas in the aorta.

Order: *Rhabditia*
Suborder: *Spirurina*
Infraorder: *Spiruromorpha*
Superfamily: *Thelaziodea*
Family: *Thelaziidae*
Genus: *Spirocerca*
Species: *Spirocerca lupi* (6,8)

Parasite morphologic characteristics (Figs. 6, 7 and 8)

Adult *Spirocerca lupi* are bright red (Fig. 2). Females are generally larger than males, as they can measure 8 cm, while males reach in average 5 cm. The lips are trilobed and the pharynx is short. The male's tail has four pairs of pre-cloacal papillae on the sides, plus an additional one, as well as two pairs of post-cloacal papillae, in addition to a group of tiny papillae located near the tail's end. The left spicule measures 2.45 to 2.8 mm and the right one 0.475 to 0.75 mm *Spirocerca lupi* eggs (Fig. 8 and 9) are thick-walled and measure 30-37 by 11-15 μm and contain larvae in the clutch.

Life cycle (Fig. 9): This parasite is usually found in countries with tropical and subtropical climates.

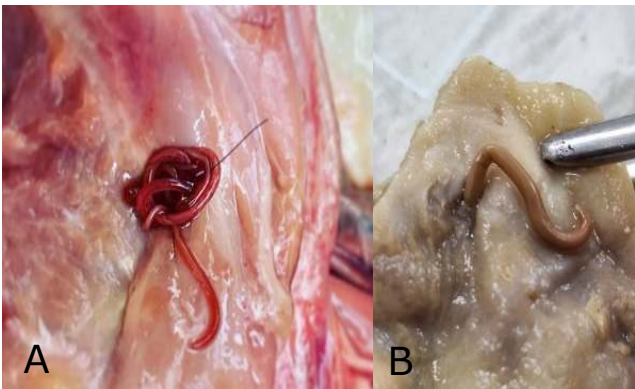


Figure 2. A and B. Adult *Spirocerca lupi* in the mediastinum.

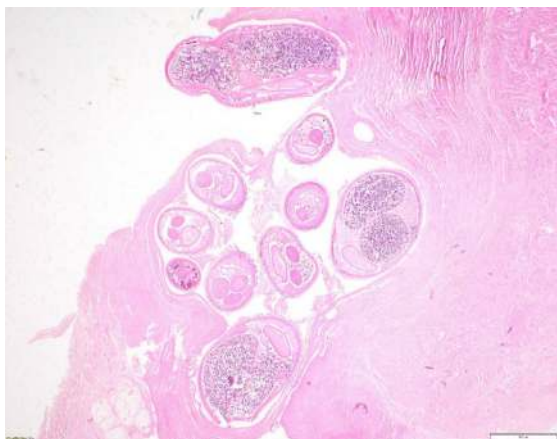


Figure 3. Esophagus, cross section of a parasitic nodule. Extensive autolysis and freezing/thawing artifact of the carcass before necropsy hampered histologic details.

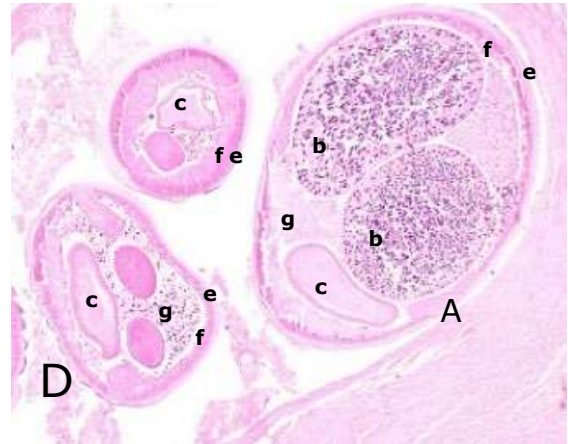


Figure 4. A, cross section of a female parasite; b, uterus filled with eggs; c, intestine; d, cross section of a female with developing uterus; e, cuticle; f, musculature; and g, pseudocoelom.

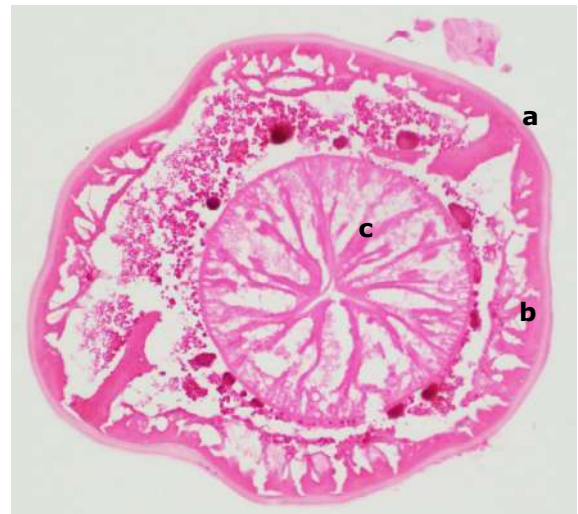


Figure 5. Cross section of *Spirocerca lupi*. Undefined sex. A, cuticle; b, musculature; and c, esophagus.

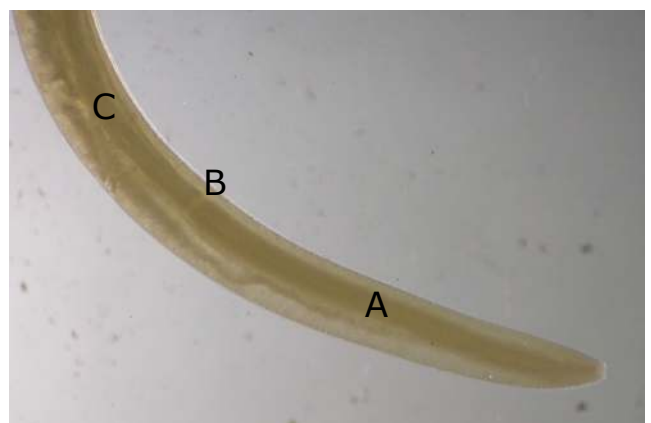


Figure 6. Adult *Spirocerca lupi*. A, esophagus; B, esophageal ring; and C, intestine.



Figure 7. Female with a heavy egg burden..



Figure 8. *Spirocerca lupi* eggs.

L3 are ingested by a definitive host, most often a dog. However, any carnivore can be infected with this parasite, with rare cases described in donkeys and goats.

The ingested larvae penetrate the gastric wall and subsequently the arteries walls, migrating to the larger arteries, such as the aorta. Two to three months after, the parasites migrate to the esophagus, perforating the blood vessels walls (9).

Adult parasites, once in the esophagus, deposit eggs and these are excreted through the animal's feces. Coleopteran insect come into contact with the feces and ingest the larvae, once inside the insect, they develop to L3 (1).

Among the beetles with a main role in propagating this disease, those of the *Canthon* genus stand out, since their distribution extends from Mexico to Nicaragua, and they have a greater predilection for dog feces.

For the definitive host to ingest the parasitic larvae again, it must ingest either the beetle or a paratenic host, such as poultry, iguanas, amphibians or small lizards, among others (4).

Comments:

The prevalence of spirocercosis in dogs from tropical countries is between 0.1 and 0.4% (5) (2). Clinically, the

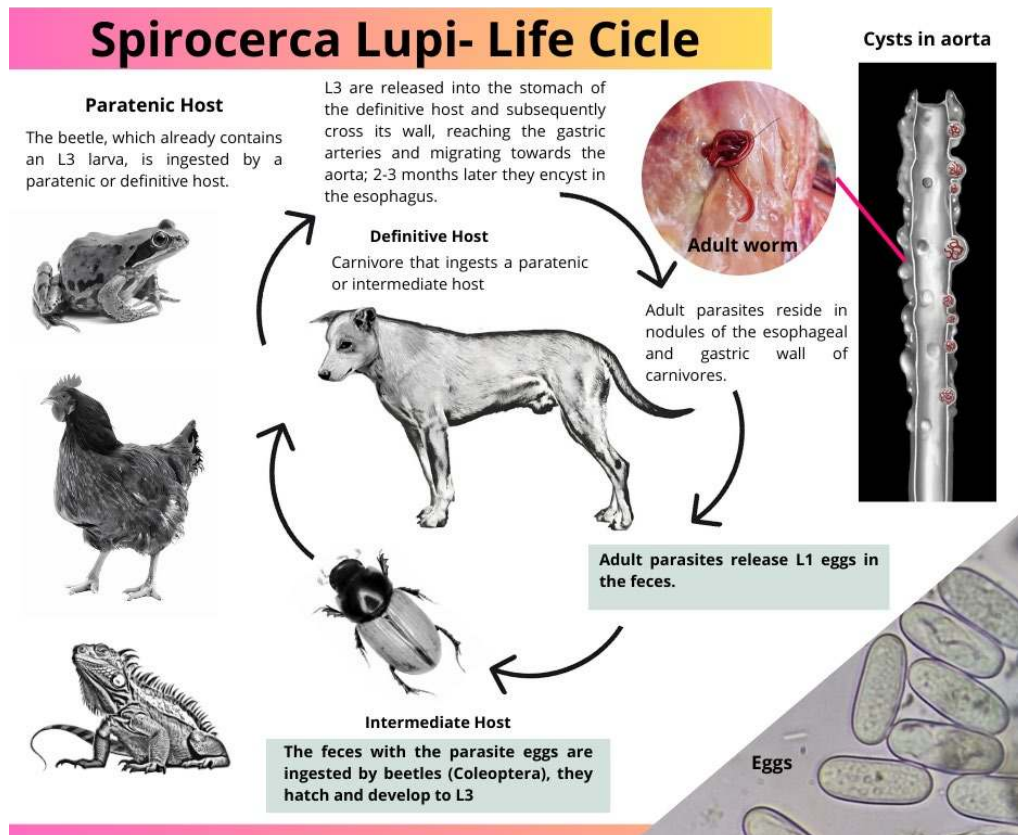


Figure 9. Life cycle of *Spirocerca lupi*.

disease is accompanied by a series of signs such as regurgitation, vomiting, cough, dyspnea, weight loss and sudden death, most likely due to aortic damage (2) (9).

Characteristic lesions are variable sized granulomas with firm to hard consistency that lodge in the esophagus and aorta of carnivorous animals, such as dogs or foxes (9). Cases in herbivores, such as goats and donkeys, have also been reported (4).

Aortic rupture secondary to stenosis caused by large number of adult parasites and increased blood pressure can lead to sudden death. Esophageal tumors such as fibrosarcomas or osteosarcomas can originate from the granulomatous lesions. In chronic cases, affected animals can develop hypertrophic osteopathy on the long bones, spondylitis of thoracic vertebrae, aplastic anemia, as well as other complications such as suppurative nephritis derived from septic showers from the esophageal lesions (10).

In Nicaragua this parasite was identified for the first time in the department of León in 2003 with a prevalence of 20% of the spp (3), however, this new finding in the department of Managua in addition to the climatic characteristics of the country, increases the probability that it is found throughout the whole territory.

Acknowledgements

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