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Source: Journal of Wildlife Diseases, 7(3) : 157-161

Published By: Wildlife Disease Association

URL: https://doi.org/10.7589/0090-3558-7.3.157

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THE PATHOLOGY OF CAPILLARIASIS IN THE BLUE JAY*

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Abstract: Capillaria contorta (Creplin, 1839) caused a diphtheritic membrane to form in the oral cavity and esophagus of blue jays (Cyanocitta cristata).

INTRODUCTION

Capillaria spp. have been recorded in the upper digestive tract of a wide variety of birds. Boyd et al. reported Capillaria contorta in 19 of 94 blue jays taken from Massachusetts, New Hampshire, and Vermont.

Descriptions of the pathologic effects of this genus of worm on the digestive tract of other birds noted extensive to violent reaction in the esophagus, crop, and mouth. Cram reported marked necrosis and sloughing of the epithelium of the esophagus and crop in bobwhite (Colinus virginianus) infected with C. contorta. A thin connective tissue capsule surrounded adult worms and everywhere there were infiltrates of lymphocytes and mononuclears.

Hung noted similar lesions in domestic turkeys infected with Capillaria annulata and described the pathogenesis as hyperemia of the mucosa followed by the nematode threading into the mucosa. Necrosis and a pseudomembrane resulted with eggs distributed throughout the membrane. Lesions extended deep into the muscularis. Lymphocytes infiltrated the involved areas.

Wehr saw a similar lesion in domestic turkeys but felt that the worm was C. contorta. Madsen saw Wehr's material and confirmed this and pointed out that C. contorta and C. annulata are synonymous.

Trainer et al. saw sections from a gyrfalcon (Falco rusticolus) which suffered from "fronce," a condition apparently common in this bird and caused by Trichomonas gallinae. What they actually found was a capillarid and their pathologic description is essentially similar to capillariasis in other birds.

This paper reports on the lesions in the blue jay.

MATERIALS AND METHODS

A local bird bander submitted a blue jay in January, 1967 which appeared to have difficulty in swallowing. A thick, white membranous structure was observed in the oral and pharyngeal cavities. Examination for oral trichomonads was fruitless but numerous capillarid ova were seen. Since then an additional 71 blue jays from September, 1967 to June, 1969 have been examined. Of these, 70 were found infected with a capillarid but no trichomonads were seen. Intensity of infection ranged from 1 to 50 worms with the mean at 7. The majority of parasites were in the mouth at the base of the tongue. Nineteen were studied for behavioral abnormalities. Gaping, swallowing difficulties, wrenching of the neck, weak flight, and apathy were noted. Three of these were simply taken by hand from low trees and these were the subject of this histopathologic study.

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The oral cavity, esophagus, and crop were opened and representative sections were fixed in 10% buffered formalin. The brain and viscera were similarly treated. Tissues were embedded in paraffin and sections were stained with hematoxylin and eosin.

RESULTS

Gross pathology

The birds were emaciated and dehydrated. The oral and pharyngeal cavities, and the esophagus down to the proventriculus were covered by a whitish diphtheritic membrane. Pieces of cracked corn (baby chick size) found in the esophagus seemed adhered to the membrane. No other alterations were noted.

Microscopic pathology

The diphtheritic membrane was scraped lightly and then examined under the microscope. Numerous double operculated eggs, typical of capillarids were seen along with a few nematode fragments only from that portion of the membrane taken from the tongue.

Tongue

Both surfaces were involved. The outermost layer or diphtheritic membrane was about 1.0 mm thick and consisted of fibrin, coagulated serum, and ghost cells, presumably from the squamous epithelium. There were numerous capillarid ova and bacterial colonies (Fig. 1). This membrane was tightly adhered to the squamous epithelium which often was without its outermost layers. There were lacunae in the epithelium which contained the nematode and often free eggs (Fig. 2). Occasionally an ulcer of the squamous epithelium which seemed limited by the muscularis was encountered. Lymphocytes were prevalent directly under the epidermis and usually the infiltration was diffuse.

FIGURE 1. Rear portion of the tongue. The dark line at the right is the dorsal squamous epithelium. To the left the light area is diphtheritic membrane. The parasites are seen in the squamous epithelium of the ventral surface. H. and E. X 30.
FIGURE 2. Ventral surface of the tongue. The parasite and ova are seen in a cyst surrounded by compressed squamous epithelium. H. and E. X 180.

FIGURE 3. Cross section of the esophagus which contains a piece of corn in the lumen. The diphtheritic membrane varies in thickness, is mostly darker than the underlying muscle. H. and E. X 18.
FIGURE 4. High power view of Fig. 3. The grain of corn is to the left. The solid tissue is denuded esophageal mucosa with diffuse lymphocytic infiltration. H. and E. X 180.

FIGURE 5. High power view of an esophagus to show the bacterial colonies which appear as dark smudges. Many heterophils are shown in this field. H. anl E. X 180.
Esophagus

A diphtheritic membrane about 2.0
mm. thick was the most striking feature. The
epithelium was completely obliterated and the membrane seemed adhered
to the muscular coats (Fig. 3). Lympho-
cytes were everywhere (Fig. 4) and fre-
quently formed nodules. Bacterial colon-
ies were numerous as in the oral cavity. Food
material was trapped in the lumen, but never were we able to find either
eggs or worms. Bacterial colonies (Fig. 5)
were commonplace. The lesions halted
at the juncture of the esophagus and the
proventriculus. The other organs examined were considered normal.

DISCUSSION
The significant lesion was the diph-
theritic membrane. Its effects were
mechanical as it prevented normal eso-
ophageal activity both by its size and
apparently sticky surface. The birds
were hungry enough or well enough to eat
but obviously could not and thus starved.

The formation of the diphtheritic
membrane was not exactly expected. In
the intestine of the chicken Capillaria
obesignata caused no such change, yet
this organ will form such a membrane
if infected with Eimeria brunetti. Appar-
ently some factor exists in C. contorta
which elicits the violent destructive forc-
ess: one is more attracted to this thesis
since marked lesions occurred in the
esophagus yet worms or eggs were not
always seen in this area. The oral fluids
drained directly into the esophagus and
probably caused the lesion. Worms were
found in both trachea and esophagus of
24 of the 71 birds examined while 45
had worms in the mouth only, and 1 in
the esophagus only. This suggests that
the reaction is more than just a mechani-
cal one.

Acknowledgements
The authors acknowledge the bird banding efforts of Mrs. Ruth A. Løf of Storrs, Conn. who
called the problem to the authors' attention. We also credit the editorial assistance of Miss Patricia
Timmins.

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Received for publication February 5, 1971