



Pathological manifestations of dipylidiasis in a 2-month-old German shepherd puppy

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Abstract

Dipylidium caninum, a zoonotic parasite, is known to be widely spread across the globe. In this case, we present a report of dipylidiasis in a puppy with the associated pathological lesions. A two-month-old German shepherd puppy was presented to the University of Jos Veterinary Teaching Hospital, Polo, with a complaint of loss of weight and inappetence. The puppy died shortly before treatment could be instituted, and the carcass was submitted for postmortem examination. A flea (*Ctenocephalides canis*) was identified on the body during the postmortem examination. The lungs were severely pale, and the intestinal mucosae had petechial haemorrhages with multiple button-like ulcers. Live worms were seen within the intestinal lumen, identified as *Dipylidium caninum*. Histopathological lesions include cellular necrosis in the submucosa and muscularis, obliteration of goblet cells and intestinal crypts in the colon. Based on the intestinal lesions observed in this report, it was concluded that dipylidiasis could be considered as a differential diagnosis in dogs at postmortem.

Introduction

Dipylidiasis is a zoonotic disease caused by a common cestode of dogs and cat, *Dipylidium caninum*. The

parasite does also infect other wild canid and felid species and these species constitute the definitive

hosts of the parasite, as its adults develop in the intestine of these definitive hosts (Cabello *et al.*, 2011). The transmission of this parasite is intricate, involving intermediate invertebrate hosts (louse or flea), which must be ingested by the vertebrate hosts, mostly carnivores and sporadically humans, for the disease to develop (Bowman, 2014; Martínez-Barbabosa *et al.*, 2014). The disease has a non-specific clinical manifestation, thereby, making proper diagnosis, treatment and prevention challenging (Julieta *et al.*, 2022). Even though the disease is said to have non-specific clinical manifestation, clinical signs such as, dullness, rough hair coat, diarrhoea, anorexia, weight loss and anal pruritus, manifesting through scratching of the perineal region against a wall, commonly known as scooting behaviour are associated with the disease (Gal *et al.*, 2007; Wani *et al.*, 2015; Saini *et al.*, 2016). The diagnosis of the disease is primarily simple and inexpensive as it is based on coprological methods, involving the macroscopic and microscopic identification of the parasites in the faeces (Julieta *et al.*, 2022). Treatment of the disease is important due to its zoonotic potentials and drugs of choice for the

treatment of dipylidiasis in dogs include single dose of praziquantel (either oral or parenteral preparations), epsiprantel and nitroscanate (Bowman, 2014). Even though dipylidiasis in dogs has been reported to be mild, with no specific clinical manifestation, we have not come across reports on pathological lesions associated with the disease. Hence, we report a case of fatal dipylidiasis in a puppy.

Case Report

History

A 2-month-old German Shepherd puppy was presented to the University of Jos Veterinary Teaching Hospital, Jos, Plateau State, Nigeria, with a complaint of loss of weight, inappetence and vomiting. The client reported having noticed the signs two days prior to the presentation. The puppy had neither history of vaccination nor deworming. Clinical examination revealed severely pale mucous membranes, weakness, and rough hair coat. The puppy was diagnosed with helminthiasis, and it died on the treatment table before samples could be taken for laboratory analysis and commencement of treatment. The carcass was then submitted for

postmortem examination and tissues were collected, fixed and routinely processed for histopathology.

Postmortem examination

The carcass was moderately emaciated, and the mucous membranes were pale. The lungs as well as the tracheal wall were severely pale. The entire intestinal mucosae had petechial haemorrhages and multifocal pale necrotic foci. The intestine contained foul-smelling brownish fluid, and both the stomach and intestine were devoid of faecal materials (indicating the puppy was not feeding for a number of days as reported by the client). A few live helminths of about 2 cm in length, identified as *Dipylidium caninum*, were seen in the colon. The colon mucosae had

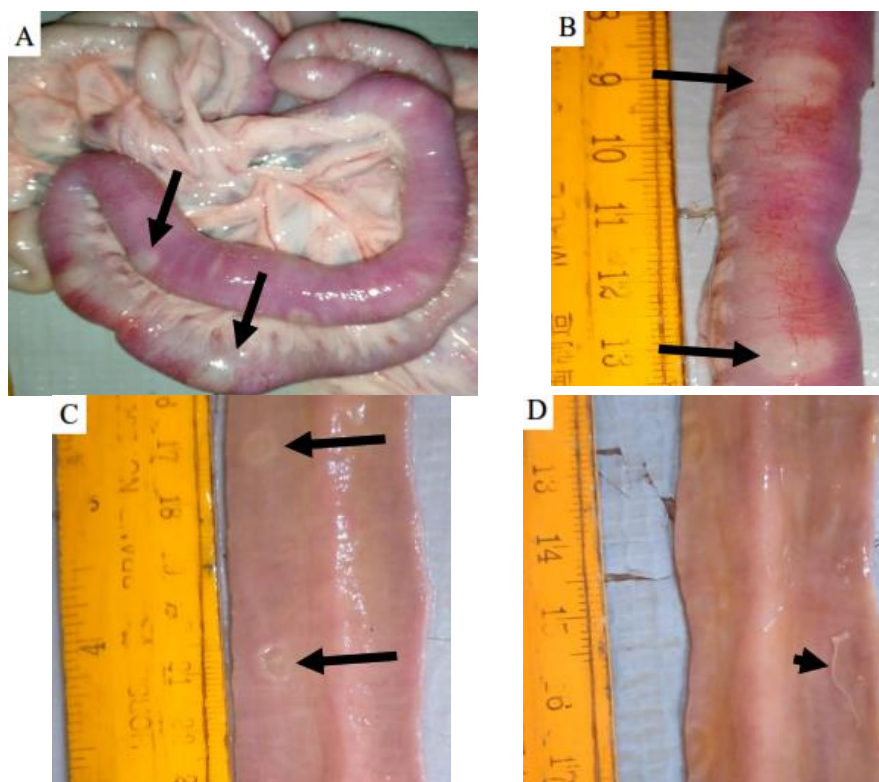


Plate I: Photograph of the colon of the puppy at postmortem A: intestine with mesentery showing moderately hyperemic colon and circumscribed necrotic lesions (black arrows), B: Hyperemic colon showing circumscribed necrotic lesions (black arrows), C: intestinal mucosae showing button-like ulcerative lesions (Black arrows), D: A *Dipylidium caninum* parasite (black arrowhead)

multiple button-like ulcers measuring 0.5 cm-1.0 cm in diameter (Plate I). Diagnosis of dipylidiasis was made based on the identification of the parasite and the ulcerative lesions on the intestinal mucosa. Sections of the lesion on the intestine (colon) were obtained and preserved in a 10% buffered formalin solution for histopathology.

A segment of the intestine was also taken and submitted to the Parasitology Laboratory of the University of Jos Veterinary Teaching Hospital, where *Dipylidium caninum* was identified from intestinal content (Plate II). The tissues were processed using the routine histopathological technique, and sections were made on a clean grease-free glass slides. The sections were processed using routine Haematoxylin and Eosin staining technique. The slides were examined using a light microscope, and representative photomicrographs of the lesions were taken using an industrial digital camera attached to the eyepiece of the microscope.

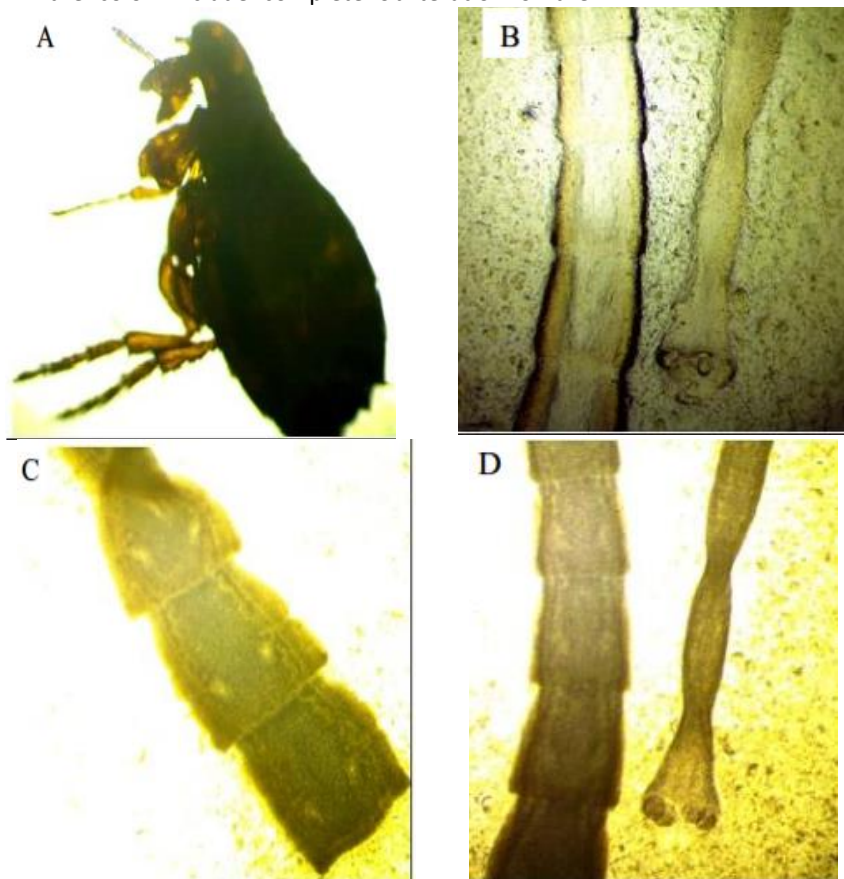
Histopathology

The predominant histopathological lesions observed in the colon include complete obliteration of the

microvilli, crypts, goblet cells and increased intraepithelial lymphocytes. Other lesions include complete obliteration of the columnar epithelial cells, goblet cells and cellular necrosis in the submucosa (Plate III).

Discussion

Aside from faecal egg count in prevalence studies, there are limited reports on dipylidiasis in dogs. We have not come across any report on possible pathological lesions associated with the disease. The presence of the intermediate host (fleas) in this case is additional diagnostic information. Hence, one can hypothesize that dogs and cats heavily parasitized with fleas, known to be the intermediate host of the parasite, have an increased risk of *D. caninum* infection (Loftin *et al.*, 2019). The puppy, in this case, was presented with complaints of loss of weight, inappetence and vomiting and clinical examination revealed very pale mucous membrane, weakness, rough hair coat and severe dehydration (sunken eye). The pale mucous membranes observed are indicative of anaemia, resulting from the blood-sucking nature



of the fleas and possible nature of the fleas and possible blood loss through the ulcerations created by the parasites in the intestine. The weakness and loss of weight observed could be linked to the inability of the puppy to feed, which could have been an attempt by the puppy to avoid pain in the intestine due to the ulcerations. This could further explain the emptiness of the gastric and intestinal lumen which were devoid of ingested materials. These observed clinical manifestations, in addition to the presence of the fleas on the puppy, which is the intermediate host of the parasite, are not different from those that have been reported (Gal *et al.*, 2007; Wani *et al.*, 2015; Saini *et al.*, 2016).

The observed circumscribed lesions in the colon, which coincided with the ulcerative lesions in the intestinal mucosa, were points of attachment of the parasite on the intestinal mucosa. The parasites seen in the

Plate II: Photomicrographs A: showing *Ctenocephalides canis* flea obtained at postmortem, B, C and D: showing different segments of the parasite, *Dipylidium caninum*

scolices in attaching to the intestinal mucosa of their host (Martínez-Barbabosa *et al.*, 2014). The ulcers created by the attachment of the parasites served as sources of loss of fluid and blood, culminating in the observed anaemia and dehydration. The observed complete obliteration of the microvilli, crypts, goblet cells, complete obliteration of the columnar epithelial cells, increased intraepithelial lymphocytes and cellular necrosis in the submucosa could only be attributed to pathologies of *D. caninum* infection in dogs. These lesions maybe associated with the attachment and movement of the parasite in the intestinal lumen.

Most reported cases of dipylidiasis are purely based on clinical manifestation and laboratory results without pathological lesions associated with the disease (Saini *et al.*, 2016; Lima & Del Piero, 2021). This could be associated with the mild nature of the disease.

However, in this case, the infection was severe and fatal with resultant intestinal lesions.

In conclusion, this report has associated some clinical signs and intestinal lesions observed in a fatal case of dipylidiasis in a 2-month-old German Shephard puppy. Even though *D. caninum* infection is not known to be fatal, we report here that the infection could be fatal if veterinary care is not provided in good time.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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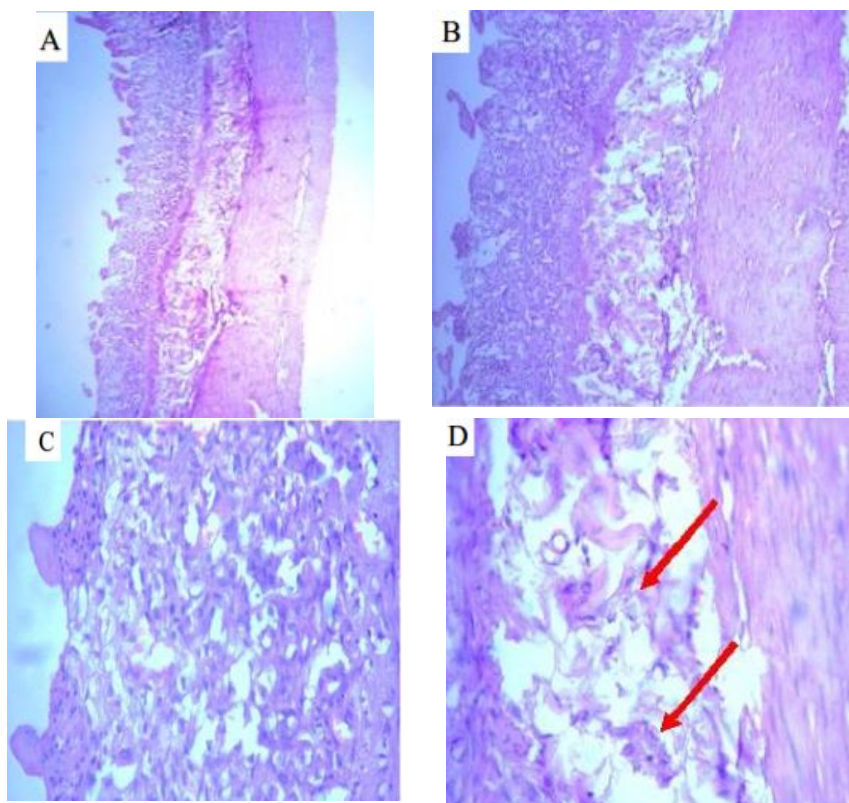


Plate III: Photomicrographs of the colon showing (A) and (B) mucosa, submucosa, muscularis and serosa with complete obliteration of the microvilli, crypts, goblet cells and increased intraepithelial lymphocytes (H&E, A: Mag. X 40, B: Mag. X 100), C: the mucosa with complete obliteration of the columnar epithelial cells, crypts and goblet cells (H&E, Mag. X 400) and D: cellular necrosis in the submucosa (Red arrows) (H&E, Mag. X 400)

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