



Filaroides osleri (*Oslerus osleri*): Two case reports and a review of canid infections in North America

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ABSTRACT

Infections of domesticated dogs by a worldwide parasitic nematode *Filaroides osleri* (*Oslerus osleri*) lead to verminous tracheobronchitis that are often misdiagnosed clinically as kennel cough, due to infection with the bacterium *Bordetella bronchiseptica*. Diagnosis of two canine cases in Wyoming, USA prompted a search of the literature of canid infections in North America. Infections of domestic dogs are reported in nine US states and four Canadian provinces. Dogs of multiple breeds and both sexes were infected. Most were two years old or younger at diagnosis. Anthelmintic treatments were effective in relieving clinical symptoms, as well as causing resolution of tracheobronchial nodules. Other canid species, including coyotes (*Canis latrans*) and wolves (*Canis lupus*), have been infected across North America with a prevalence of 23% and 4%, respectively. Infection with *F. osleri* should be included in the differential diagnosis of infectious tracheobronchitis of dogs. It can be confirmed most readily by endoscopic detection of distinctive submucosal parasite-filled nodules, combined with histological examination of endoscopic biopsies.

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1. Introduction

Filaroides osleri (*Oslerus osleri*) is a nematode parasite of cosmopolitan distribution with a direct life cycle that infects domestic and free-ranging canid species (Taylor et al., 2007). Adults reside in tracheobronchial nodules. The nodules, often concentrated around the tracheobronchial bifurcation, occur in the lamina propria of major airways. The gravid females protrude their caudal end through the respiratory epithelium to lay embryonated eggs in the lumen. Many eggs hatch immediately, releasing the first stage larvae that are directly infectious. Eggs and larvae are coughed up and either expectorated in sputum or swallowed and voided in feces. Susceptible hosts are infected

by ingestion of the first-stage infective larvae. Maternal grooming is assumed to be the major transmission route in domestic dogs, whereas regurgitative feeding of the young by parents appeared to be the major means of infection in free-ranging canids (Clayton and Lindsay, 1979; Bowman, 2009). Since some eggs readily hatch and release the first-stage infective larvae prior to regurgitation or defecation, autoinfection is a possibility (Lappin and Prestwood, 1988).

Following infection, the first-stage larvae penetrate the mucosa of the gastrointestinal tract, and travel to the right side of the heart via lymphatics or the hepatic venous circulation. Larvae migrate to the lungs via pulmonary arteries. Development from the first-stage larvae to adult occurs in the respiratory tract and tracheobronchial nodules are formed, where the life cycle is completed (Clayton and Lindsay, 1979). The prepatent period is approximately ten weeks (Dorington, 1968; Dunsmore and Spratt, 1979). The resulting verminous tracheobronchitis varies

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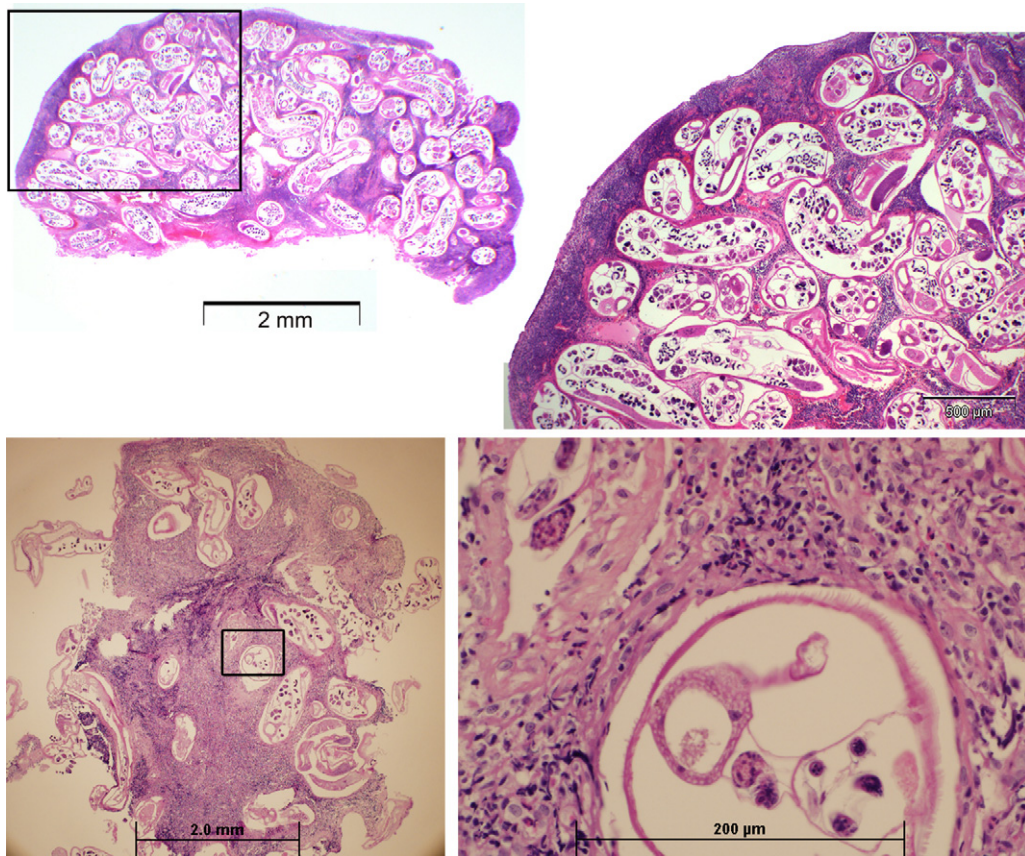


Fig. 1. Histology of a nodule found in each of the two domestic dogs. Top panels: case #1 and bottom panels: case #2. The slides were H-E stained. Sections of whole nodules with coiled female adults are shown. Inserts at right show numerous cross sections of female adults containing embryonated eggs (top panel) and a granuloma around a worm with macrophages, eosinophils, lymphocytes and plasma cells (bottom panel).

in severity in domestic dogs, and does not necessarily reflect the degree of pathological changes (Clayton and Lindsay, 1979). Many infected domestic dogs are clinically asymptomatic (Caswell and Williams, 2007) with little respiratory distress even in the presence of submucosal nodules (Taylor et al., 2007). When infections are not occult, the most common symptom is a sporadic, non-productive cough, which is exacerbated by exercise and/or excitement or induced by tracheal palpation. Dyspnea, exercise intolerance and cyanosis may occur (Clayton and Lindsay, 1979). A single case of pneumothorax due to *F. osleri* infection is reported (Burrows et al., 1972). Canine filaroidosis is rarely diagnosed although cases occur worldwide. Two plausible reasons for its rarity as a clinical disease are occult infection and clinical misdiagnosis as kennel cough. Two cases of the latter are presented here. Two dogs with symptomatic *F. osleri* infection were diagnosed in Wyoming, USA. Both were previously misdiagnosed as kennel cough. The correct diagnosis was established by endoscopy and histopathology. The experience underscored the lack of updated information on the disease. A literature review was made of the parasite's life cycle and distribution, and of the clinical presentation, diagnosis and treatment of canine filaroidosis. Most importantly, patients can be cured by anthelmintics following correct diagnosis.

2. Case report

Case #1 (WSVL Accession No: 04C146, 2004). An intact 2-year old 15 kg female Border collie native to Wyoming was presented with a clinical complaint of coughing for 6 months. The collie had never been out of state and was a working ranch dog. Other signs were gagging a small amount of mucus with exacerbation by cold weather. Episodes occurred two to three times a month. The bitch had been treated with two courses of amoxicillin and Temaril-P® (canine antipruritic and antitussive containing trimeprazine tartrate and prednisolone) which temporarily relieved the clinical signs. Signs recurred when medication was stopped. Routine hematology was unremarkable. Radiography revealed bronchial congestion without evidence of pneumonia. The cardiac silhouette was normal and there was no indication of cardiac failure. Multifocal raised submucosal masses in distal trachea and proximal main-stem bronchi were detected by direct endoscopy. They contained slowly moving nematodes, some of which protruded and retracted from nodules. One 6 mm × 5 mm × 5 mm nodule was removed endoscopically for histological examination. A tracheal swab was submitted for aerobic bacterial culture. The submucosal nodule was covered by ciliated respiratory epithelium and con-

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