



DIAGNOSTIC EXERCISE

From The Davis-Thompson Foundation*

Case #: **243**; Month: **August**; Year: **2024**
Answer sheet

Title: *Onchocerca cervicalis* in a pony

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History: A 7-year-old pony gelding was submitted for necropsy with a history of inability to stand for two days after his head was caught in a tree. On presentation, he was laterally recumbent with dilated pupils and absent pupillary light reflexes (PLRs), intermittent horizontal nystagmus, absent facial sensation, and an absent panniculus reflex along the neck and cranial thorax. He had delayed withdrawal reflexes in the front limbs. His vaccination history was unknown, and he was euthanized for poor prognosis and concern for rabies.

Necropsy findings: The left side of the frontal bone had a complete, 12 cm, semi-circle fracture, and the underlying cerebrum had a large area of hemorrhage and necrosis. The 12th and 13th right ribs and 7th, 8th, and 9th left ribs had complete, mid-diaphyseal fractures with surrounding hemorrhage. The nuchal ligament had a cavitated, 17.5x4.5x3.5 cm pocket that contained a moderate amount of yellow fluid and soft, friable, pale tan caseous material (Figs 1 and 2). Samples of the ligament (Figs 3-6) were collected for histopathology.

Gross and Histological Images:



Figure 1. Nuchal ligament of the pony. The center of the ligament is replaced by a pocket containing soft, friable, pale tan caseous material.



Figure 2. Nuchal ligament, closer view of caseous material.

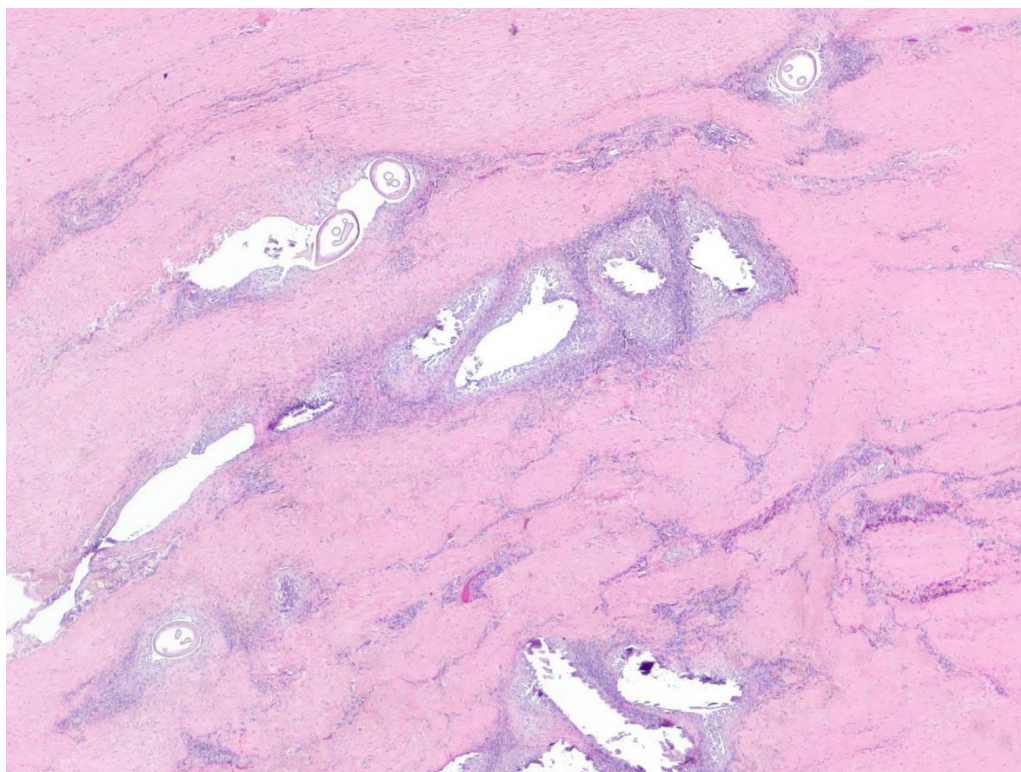


Figure 3: H&E. Nuchal ligament of the pony with Onchocerciasis. The collagen fibers are multifocally disrupted by coalescing inflammatory nodules.

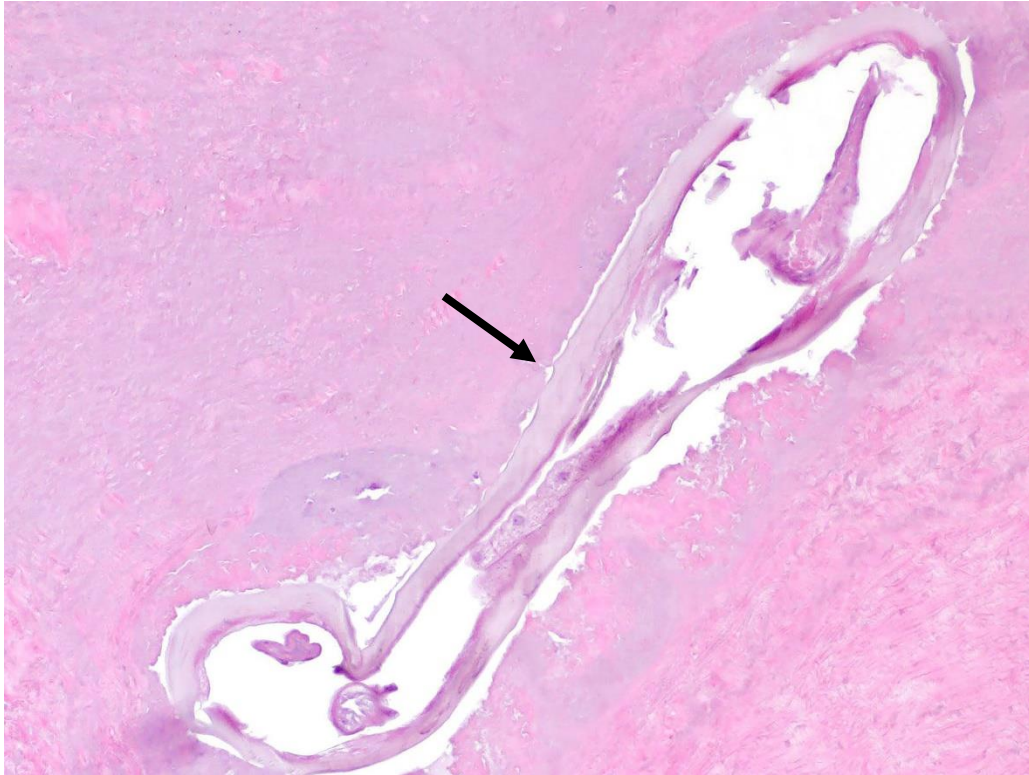


Figure 4: H&E. Degenerate *Onchocerca cervicalis* in the nuchal ligament. The nematode has a smooth eosinophilic cuticle with cuticular ridges (arrow).

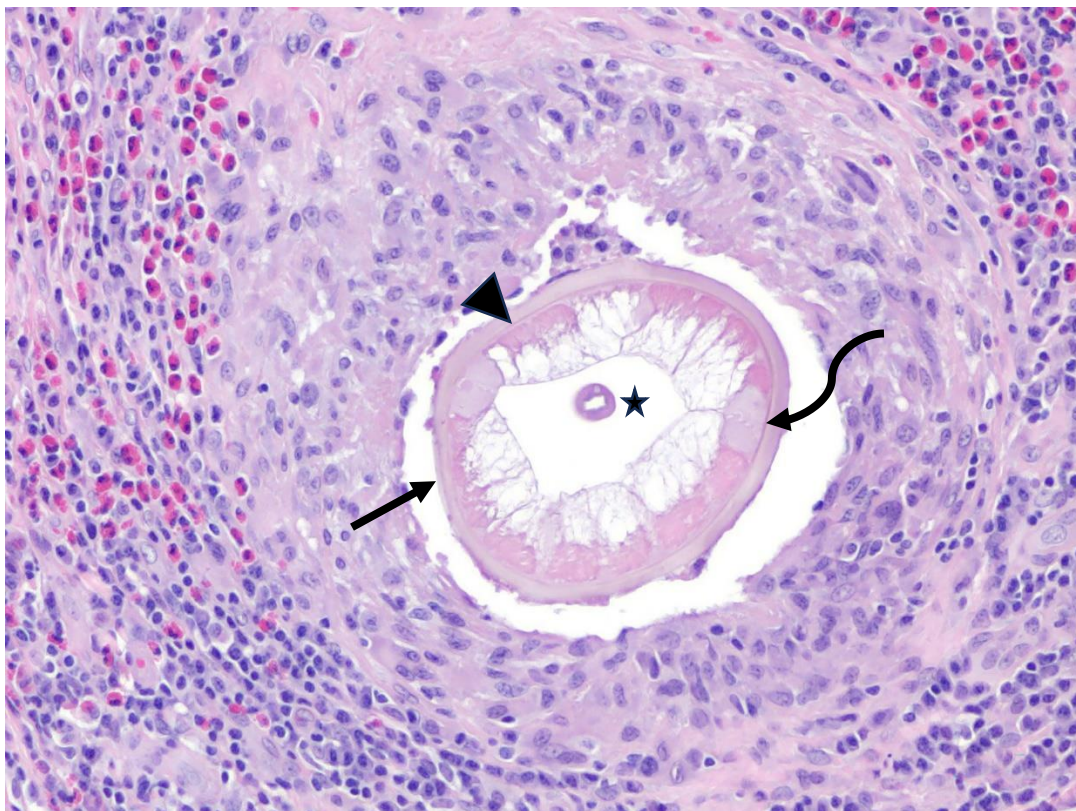


Figure 5: H&E. Inflammatory nodule in the nuchal ligament of the pony. The inflammatory nodules are composed of macrophages, multinucleated giant cells, lymphocytes, eosinophils, and fewer plasma cells, all centered on adult nematodes (granulomas). The nematodes have a smooth eosinophilic cuticle (straight arrow), coelomyarian musculature (arrowhead), lateral cords (curved arrow), and a pseudocoelom containing a narrow intestine (star), consistent with *Onchocerca cervicalis*.

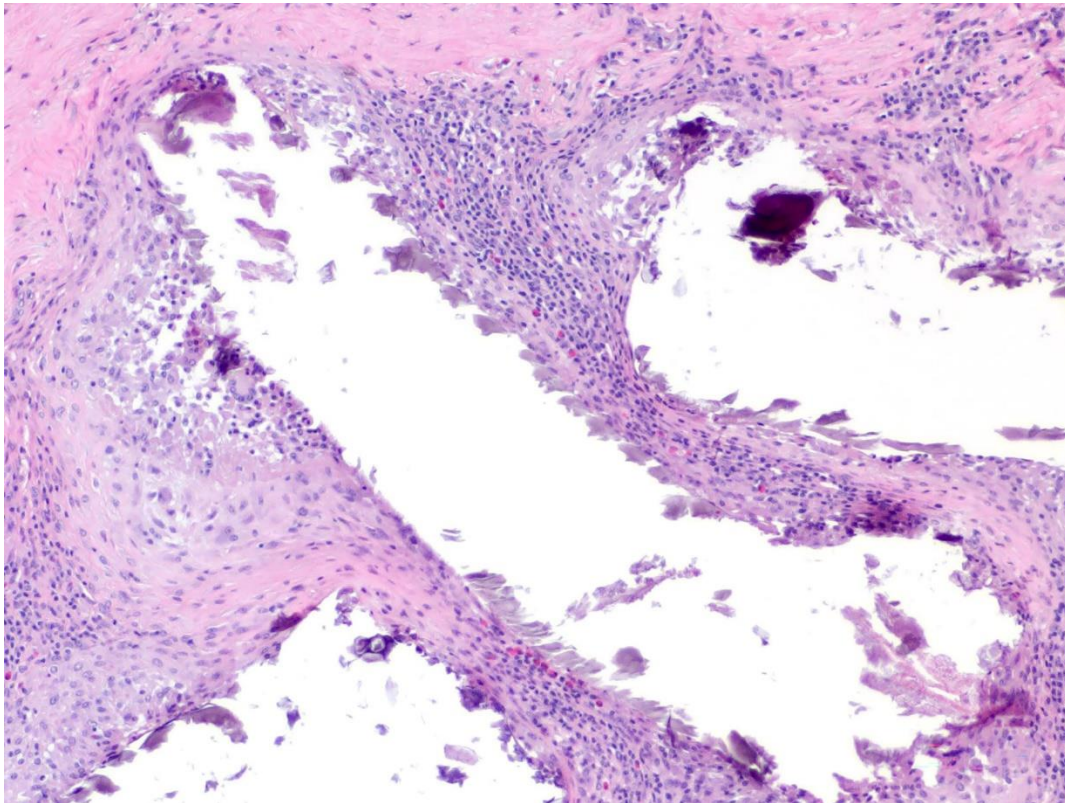


Figure 6: H&E. Nuchal ligament of the pony. Granulomas are multifocally mineralized.

Histologic description:

Nuchal ligament (Fig 3-6): The collagen fibers are multifocally disrupted by inflammatory nodules composed of moderate numbers of macrophages, multinucleated giant cells, lymphocytes, eosinophils, and fewer plasma cells (granulomas) (Fig 3). The granulomas are encircled by collagen (fibrosis) and centered on numerous adult nematodes (Fig 4). The nematodes have a smooth eosinophilic cuticle with cuticular ridges (Fig 4), coelomyarian musculature, lateral cords, and a pseudocoelom containing a narrow intestine (Fig 5) and reproductive structures (not shown). Granulomas are multifocally centered on shards of fragmented, basophilic material (mineral) (Fig 6).

Morphologic diagnosis:

Moderate, multifocal, chronic, granulomatous and eosinophilic desmitis with mineralization and intralesional nematodes.

Etiology: *Onchocerca cervicalis*.

Intermediate host: *Culicoides* spp.

Comments:

Onchocerca cervicalis is a filarial nematode whose adults reside in the ligamentum nuchae and supraspinous bursa of equids. When adults die, they mineralize and incite an inflammatory reaction (7). *O. cervicalis* adults have been associated with fistulous withers and poll evil in horses; however, not all infected horses develop these conditions, and thus the role of *O. cervicalis* in these conditions is unclear (8). Most animals are apparently asymptomatic as the infection is usually undetected (7,8).

The intermediate host for numerous *Onchocerca* spp. is *Culicoides* spp., the biting midge. The midge ingests the microfilariae from the dermis during a meal, and the microfilariae mature into larvae and reenter the horse dermis via inoculation after 2-4 weeks. The larvae migrate and develop into adults in the nuchal ligament for *O. cervicalis*. Adults within the nuchal ligament produce microfilariae which migrate via the connective tissue and lymphatics to the dermis (7). Common sites for microfilariae include the ventral midline, withers, neck, and face (4,7). Dead microfilariae can produce an intense inflammatory response composed of eosinophils and lymphocytes, which manifests as pruritus, alopecia, and scale (7). This pony did not have any gross evidence of microfilarial dermatitis, and the skin was not evaluated histologically. It is presumed that living microfilariae do not incite an inflammatory response in the skin (7).

O. cervicalis affects equids with varying prevalence worldwide, with published cases from the United States, Quebec, southwestern British Columbia, Brazil, Africa, Australia, and Egypt (1-6, 8-10). Animals older than 5 years old are more likely infected, suggesting that *O. cervicalis* is an infection of older horses (4,9,10). Many of the published studies documented prevalence greater than 50% in surveyed animals, although more recent data is needed to determine current prevalence. Diagnosis requires documentation of microfilariae within skin samples (biopsy or dissection) or identification of adults within the nuchal ligament at necropsy.

References:

1. Cummings E, James ER. Prevalence of equine onchocerciasis in southeastern and midwestern United States. *J Am Vet Med Assoc.* 1985; 11: 1202-3.

2. Dagnae M, Zemene M, Getaneh G, Tibebu S. A Review on Equine Onchocerciasis. *Af J Basic Applied Sci.* 2016; 8: 27-33.
3. Klei TR, Torbert B, Chapman MR, Foil L. Prevalence of *Onchocerca cervicalis* in equids in the Gulf Coast region. *Am J Vet Res.* 1984; 8: 1646-7.
4. Lees MJ, Kleider N, Tuddenham CC. Cutaneous onchocerciasis in horse. *Can Vet J.* 1983; 24: 3-5.
5. Llyod S, Soulsby EJ. Survey for infection with *Onchocerca cervicalis* in horses in eastern United States. *Am J Vet Res.* 1978; 12: 1962-3.
6. Marques SMT, Scroferneker ML. *Onchocerca cervicalis* in Horses from Southern Brazil. *Tropical Animal Health and Production.* 2004; 36: 633-636.
7. Maxie MG. Jubb, Kennedy, and Palmer's Pathology of Domestic Animals. 6th rev. ed. St Louis: Elsevier; 2016. 248 p.
8. Ottley ML, Dallemagne C, Moorhouse DE. Equine onchocerciasis in Queensland and the Northern Territory of Australia. *Australian Vet JI.* 1983; 60: 200-203.
9. Radwan AM, Ahmed NE, Elakabawy LM, Ramadan MY, Elmadawy RS. Prevalence and pathogenesis of some filarial nematodes infecting donkeys in Egypt. *Vet World.* 2016; 8: 888-892.
10. Stannard AA, Cello RM. *Onchocerca cervicalis* infection in horses from the western United States. *Am J Vet Res.* 1975; 7: 1029-31.

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