Diagnostic exercise From The Latin Comparative Pathology Group and the Davis-Thompson Foundation: Equine cutaneous habronematidosis
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Diagnostic Exercise
From The Latin Comparative Pathology Group*

Equine cutaneous habronematidosis

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Clinical History:

A 4-year-old Quarter Horse stallion was unsuccessfully treated for a circumscribed and ulcerated lesion of unknown duration located lateral to the prepuce (Fig. 1).

Microscopic description:

The superficial and deep preputial dermis contains multifocal to coalescing, well-demarcated eosinophilic granulomas (Fig. 2) characterized by a central area of abundant eosinophilic necrotic debris mixed with degenerate eosinophils surrounded by numerous epithelioid macrophages and occasional multinucleated giant cells (foreign-body type), rimmed by ill-defined layers of fibrous connective tissue. In the center of the granulomas, there are cross-sections of degenerate nematode larvae (Fig. 3). The adjacent dermal collagen is expanded by dense inflammatory infiltrate composed mainly of eosinophils and a few lymphocytes and plasma cells (Fig. 4). The dermal microvasculature is prominent, with hypertrophic reactive endothelial lining. There is also vascular proliferation amidst perpendicularly oriented plump fibroblasts embedded in collagen (granulation tissue). In addition, there are numerous shrunken, hypereosinophilic, fragmented or hyalinized collagen bundles, occasionally surrounded by degranulated eosinophils (flame figures).

Follow-up questions:

- *Morphologic diagnosis*
- *Etiologic diagnosis*
- *Possible causes*
- *Disease*

**The Diagnostic Exercises are an initiative of the Latin Comparative Pathology Group (LCPG), the Latin American subdivision of The Davis-Thompson Foundation and published in cooperation with the Brazilian Journal of Veterinary Pathology. These exercises are contributed by members and non-members from any country of residence. Consider submitting an exercise! A final document containing this material with answers and a brief discussion will be posted on the CL Davis website: https://davisthompsonfoundation.org/diagnostic-exercise/*

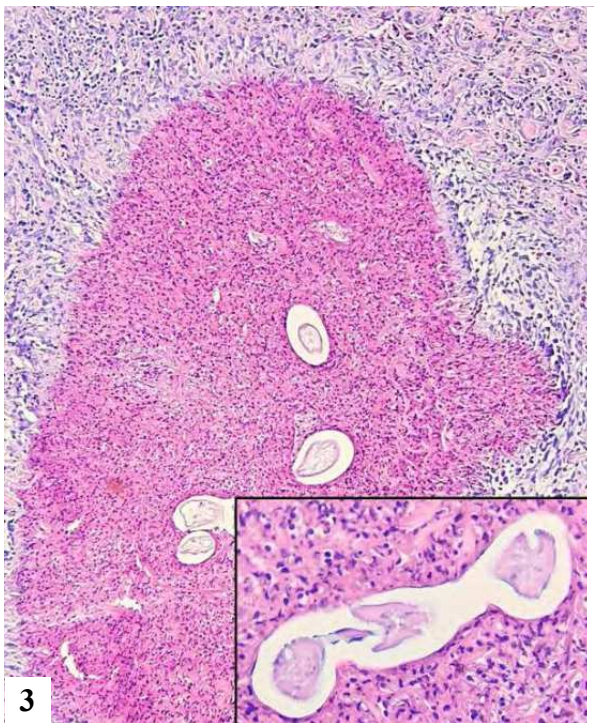
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Figure 1. Gross appearance of the ulcerated lesion lateral to the prepuce. Inset:Samples collected by punch biopsy.
Figure 2. Skin, horse. Hematoxylin and eosin (HE), 2x. The dermis contains multifocal to coalescing, well-demarcated, eosinophilic areas (eosinophilic granulomas).



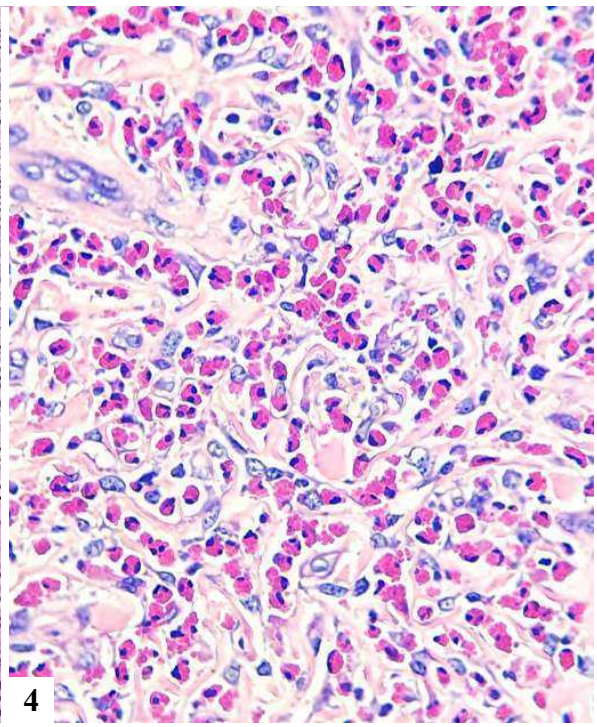


Figure 3. Skin, horse. HE, 20x. Inset:40x. The eosinophilic granulomas are characterized by a central area of abundant eosinophilic necrotic debris mixed with degenerate eosinophils, surrounded by numerous epithelioid macrophages and occasional multinucleated giant cells, rimmed by ill-defined layers of fibrous connective tissue. In the center of the granulomas, there are cross-sections of degenerate nematode larvae.
Figure 4. Skin, horse. HE, 40x. The adjacent dermal collagen is expanded by dense inflammatory infiltrate composed mainly of eosinophils and a few lymphocytes and plasma cells.

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- **Morphologic diagnosis:** Preputial skin: Marked diffuse eosinophilic dermatitis with multifocal to coalescing eosinophilic granulomas and intralesional nematode larvae.

- **Etiological diagnosis:** Parasitic dermatitis / Cutaneous habronematidosis.

- **Possible causes:** *Habronema majus*, *H. muscae* or *Draschia megastoma*.

- **Disease:** Summer sore.

Discussion:

The microscopic findings were compatible with habronemiasis. This report will use the condition's name according to the Standardized Nomenclature of Parasitic Disease (SNOAPAD) (4). This system recommends that the disease caused by worms in the genus *Habronema* would be referred to as habronemosis, while disease caused by *Habronema Draschia*, or speciated worms in this family, would be habronematidosis (1). Thus, if one is unsure whether *Habronema* or *Draschia* is the cause (which is the case in this report), it is appropriate to use habronematidosis (1). The condition is caused by the aberrant deposition of larvae of the spirurid nematodes *Habronema majus*, *H. muscae* or *Draschia megastoma* by flies (*Musca* spp. and *Stomoxys calcitrans*) on cutaneous or mucocutaneous sites (2,5). The adult nematodes inhabit the stomach of horses, and their eggs and larvae are passed in feces and ingested by fly maggots. The larvae are then deposited on the horse through the proboscis of the host fly, and the clinical signs depend on where the larvae are deposited. When deposited near the oral cavity, the larvae may be swallowed and complete the cycle in the stomach. If deposited near the nasal cavity, they may migrate to the lungs, causing pulmonary habronemiasis. If deposited in other areas of the body, which is what occurs most often, the larvae migrate into the skin or mucous membranes and cause hypersensitivity reactions (2,3,5). On the cut section, the nodular lesions of brown-red granulation tissue contain the typical caseous or mineralized foci (5). Common microscopic findings include nodular to diffuse eosinophilic dermatitis with eosinophilic granulomas characterized by degenerate and necrotic eosinophils and degenerating nematode larvae in the center. Surrounding these foci are epithelioid macrophages, multinucleated giant cells, lymphocytes, and plasma cells, further rimmed by fibroblasts (2, 5, 6).

In only half of the cases, nematode larvae are found in the caseous foci. Larvae are usually degenerated and sometimes mineralized (5). They have a thick cuticle, coelomyarian-polymyarian musculature, prominent lateral chords, and a digestive tract lined by cuboidal cells (3).

For the gross lesions, differential diagnoses should include neoplasia such as equine sarcoid or squamous cell carcinoma, exuberant granulation tissue granulomas caused by bacteria (e.g., botryomycosis), fungi, or pythiosis (3,6).

Microscopic differential diagnoses for eosinophilic nodular dermatitis without apparent larvae are pythiosis, eosinophilic collagenolytic granuloma, and mast cell tumor. *Habronema* has also been reported as a secondary infection of cutaneous lesions induced by *Pythium insidiosum*, *Corynebacterium pseudotuberculosis*, and squamous cell carcinoma (3). The definitive diagnosis of cutaneous habronematidosis is based on history, physical examination, impression smears, and biopsy. PCR may help confirm the diagnosis if larvae are not visible within cytology or biopsy specimens (2,6,6).

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