

# Pathology in Practice

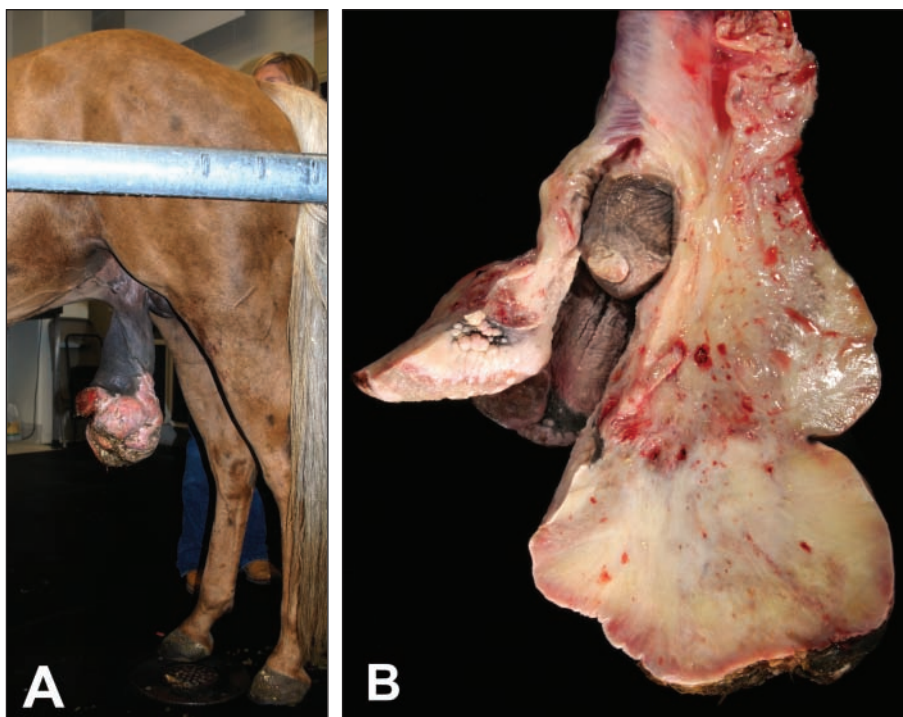


Figure 1—Photographs of a 6-year-old Quarter Horse that was evaluated because of a preputial mass (A) and a specimen of the preputial mass (sectioned sagittally) obtained following en bloc penile resection (B). Prior to surgery, the mass circumferentially expands the cranial end of the prepuce; a large portion of the prepuce is coarsely nodular and ulcerated. On cut surface, the resected tissue specimen contains off-white, firm granulation tissue, which has proliferated to expand the cranial end of the prepuce.

## History

A 6-year-old 464-kg (1,021-lb) Quarter Horse stallion was evaluated because of a preputial mass. The owners reported that the horse had developed a preputial rash approximately 1 year earlier (in the fall of that year). The horse had been treated with penicillin IM and then topical administration of silver nitrate ointment. The rash developed into a mass that progressively enlarged and became ulcerated.

## Clinical and Gross Findings

Upon physical examination, the superficial inguinal lymph nodes were enlarged and firm. Most noticeably, a large, multilobulated, firm, pink ulcerated mass circumferentially expanded the cranial end of the prepuce (Figure 1); the swelling extended to the caudal as-

pect of the prepuce. A CBC was performed, and marked neutrophilia (14,145 cells/L; reference range, 2,260 to 8,580 cells/L) and eosinophilia (4,100 cells/ $\mu$ L; reference range, 0 to 1,000 cells/ $\mu$ L) were evident. Because of the mass and the structures involved, an en bloc penile resection and castration were performed and the tissue was submitted for histologic examination. The enlarged, firm superficial inguinal lymph nodes were also removed and submitted. The horse's recovery from anesthesia was uneventful.

A 45-cm-long specimen (20 cm at its widest point) of the prepuce and the distal 18 cm of the penis was first examined grossly. At the cranial end of the prepuce, a coarsely nodular, ulcerated, firm mass effaced the preputial orifice. The mass was composed of 2 major and confluent (15  $\times$  12  $\times$  12-cm and 9  $\times$  12  $\times$  8-cm) nodules that enveloped but did not involve the glans penis. The nodules had a firm, carrot-like consistency and were slightly off-white (Figure 1). A second tissue specimen comprised a lymphocenter of 11 lymph nodes (ranging from 6  $\times$  4  $\times$  2.5 cm to 1 cm in diameter) embedded in fat.

**Formulate differential diagnoses from the history, clinical findings, and Figure 1—then turn the page →**

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## Histologic Findings

Histologic examination of sections of the mass revealed an abundant amount of granulation tissue and numerous granulomas that expanded the subcutis and submucosa of the inner lamina of the prepuce (Figure 2). Granulomas were composed of an outer layer of fibroblasts, epithelioid macrophages, eosinophils, and foreign-body multinucleated giant cells, which surrounded a core of numerous degenerate eosinophils and neutrophils ad-

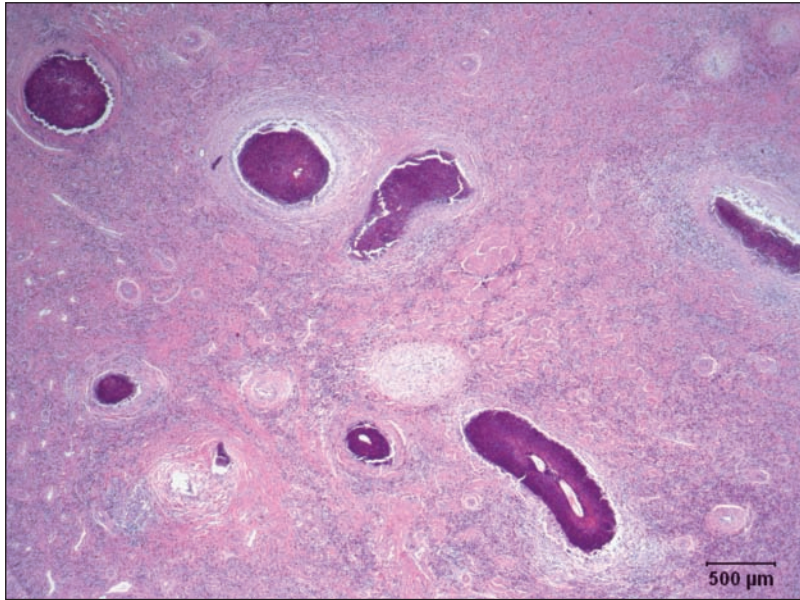


Figure 2—Photomicrograph of a section of the preputial mass removed from the horse in Figure 1. Notice the multifocal, eosinophilic granulomas. H&E stain; bar = 500 µm.

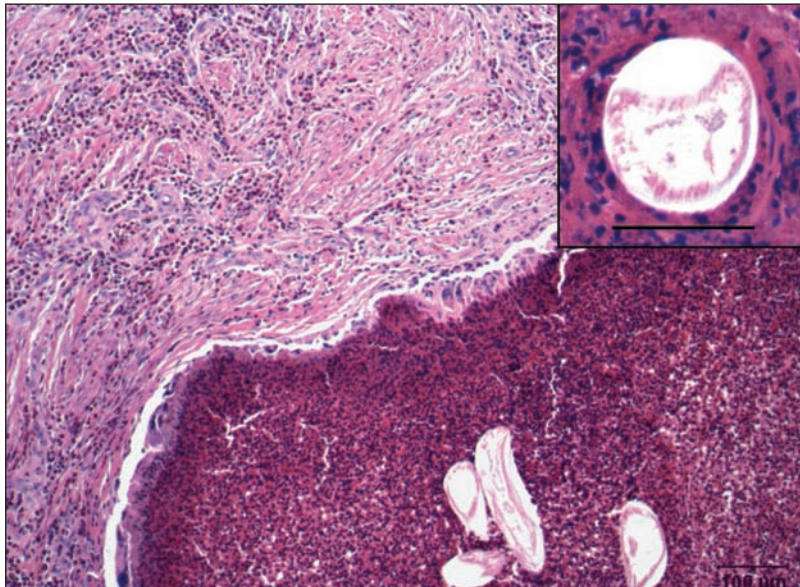


Figure 3—Photomicrograph of an eosinophilic granuloma in a section of the preputial mass removed from the horse in Figure 1. The granuloma is composed of a core of abundant viable and degenerate neutrophils and eosinophils admixed with abundant necrotic debris, and it contains profiles of degenerating metazoan parasites. Surrounding the core, there is a layer of macrophages and multinucleated giant cells that border an outer layer of fibroblasts with a large number of eosinophils. The inset panel contains an image of a degenerating metazoan parasite, which is characterized by an external cuticle and coelomyarian musculature typical of *Habronema* spp. H&E stain; in the main and inset images, bar = 100 and 50 µm, respectively.

mixed with eosinophilic cellular and karyorrhectic debris (necrosis). Often within the necrotic debris, fragments and profiles of metazoan parasites characterized by an external cuticle and coelomyarian musculature were detected (Figure 3). Many eosinophils diffusely infiltrated the subcutis. The squamous epithelium overlying the mass was hyperplastic and multifocally ulcerated, often replaced by abundant, eosinophil-rich granulation tissue.

Histologic examination of the inguinal lymph nodes revealed a hyperplastic paracortical area with formation of germinal centers. Numerous eosinophils diffusely infiltrated the lymph nodes' sinusoids and subcapsular sinuses.

## Morphologic Diagnosis

Severe, chronic, diffuse, eosinophilic, granulomatous posthitis with granulation tissue and intralesional nematode larvae (consistent in appearance with *Habronema* spp) and lymphoid hyperplasia with eosinophilia.

## Comments

Cutaneous habronemiasis, caused by the spirurid nematode *Habronema muscae* or *Habronema microstoma*, develops frequently in horses in temperate and tropical climates. The adult worms are 1 to 2 cm in length and are typically found on the mucosal surface of the stomach where they can cause mild gastritis. Adult nematodes shed eggs that develop into larvae, which if ingested by larvae of stable flies (*Stomoxys calcitrans*) or houseflies (*Musca domestica*) can further develop into the infective third-stage larvae. Flies deposit the infective larvae on warm, moist surfaces such as the muzzle, conjunctiva, glans penis, prepuce, or cutaneous wounds of horses. Larvae that are swallowed continue their life cycle; however, aberrant larvae invade the skin, stimulating an intense eosinophilic reaction that is very pruritic.<sup>1</sup> The lesions associated with cutaneous habronemiasis are often referred to as summer sores because they most commonly develop during the spring and summer when the weather is warm and flies are active.<sup>2,3</sup> Lesions often regress during the winter. The most commonly affected sites are the medial canthus of the eye, the prepuce and glans penis, and cutaneous wounds. Gross lesions are first noticed as irregularly shaped, rapidly growing papules that progress to ulcerated, tumor-like masses of granulation tissue. On cut surface, lesions often contain multifocal, small, white, caseous, and occasionally gritty foci. Involvement of the conjunctiva usually results in conjunctivitis with photophobia, profuse

lacrimation, and chemosis. Penile and preputial lesions may result in dysuria.

Histologically, *Habronema* lesions consist of numerous eosinophilic granulomas scattered throughout a collagenous fibrovascular stroma.<sup>2</sup> The granulomas are composed of numerous eosinophils, epithelioid macrophages, and multinucleated giant cells surrounding a central area of necrosis that may contain degenerating or mineralized larvae. Larvae are often difficult to discern in chronic lesions. Degranulating eosinophils may surround collagen bundles, resulting in collagenolysis (so-called flame figures). The surface of a lesion may be ulcerated with abundant granulation tissue.

Both neoplastic and nonneoplastic penile and preputial masses develop commonly in horses, and it is important to have a list of differential diagnoses to formulate a diagnostic and therapeutic plan for affected animals. Squamous cell carcinoma, sarcoid, melanoma, pythiosis, botryomycosis, cutaneous habronemiasis, and exuberant granulation tissue can result in penile or preputial masses.<sup>2,4,5</sup> Although a patient's history and the gross appearance of the mass may narrow the differential diagnosis list, histologic examination of biopsy specimens of the mass should be performed promptly to aid in confirmation of the diagnosis.

Treatment of cutaneous habronemiasis depends upon the severity of the lesion. Massive lesions, such as that affecting the horse of this report, or lesions that are refractory to medical treatment may require excision for resolution. Lesions that are less severe may respond to topical and systemic administration of anti-inflammatory drugs as well as larvicidal drugs such as ivermectin. Fly control and elimination of adult nematodes from the stomach of affected horses are important preventative measures.

## References

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