History

A 5-year-old 499-kg (1,098-lb) castrated male Quarter Horse was submitted to the Oklahoma State University Animal Disease Diagnostic Laboratory because of a 6-week history of unilateral epistaxis from the right naris. Multiple antimicrobial treatments had been ineffective. Nasal endoscopic examination had revealed proliferative tissue covering the left auditory tube diverticulum (guttural pouch) opening and the surrounding areas. Because of financial constraints, the owner elected euthanasia of the horse.

Clinical and Gross Findings

The horse had a body condition score of 4 of 9. Necropsy revealed that the subcutaneous and visceral adipose tissues were diffusely dark yellow. The right naris was soiled by fresh blood. The right nasal septum was thickened, in an approximately 10 × 6-cm area, by raised, multifocal to coalescing, irregular ulcerated masses, which were surrounded by light gray friable necrotic tissue and pools of hemorrhagic material (Figure 1). Few similar, isolated, raised ulcerated masses were also present in the larynx, at the opening of the right and left guttural pouches, and in the mucosa of the proximal ventrolateral portion of the trachea. There were no gross lesions in the guttural pouches. Retropharyngeal and cervical lymph nodes were mildly large with thickened cortex and indistinct medulla on cut section.

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

Initially, the main differential diagnoses for this horse included a granulomatous process and a malignant tumor. Histologic examination of sections of the right naris revealed that the mucosa and submucosa were markedly infiltrated and expanded by numerous granulomas. The granulomas were composed of peripheral aggregates of epithelioid macrophages and multinucleated giant cells admixed with variable numbers of intact and degranulated eosinophils, intact and degenerated neutrophils, hemosiderophages, lymphocytes, and plasma cells; the aggregates were surrounded regionally by fibrous connective tissue (Figure 2). The core of these granulomas contained clubs of eosinophilic material admixed with degranulated eosinophilic granules; the clubs were arranged in a palisading pattern (Splendore-Hoeppli phenomenon) and were centered on longitudinal and cross-sectional profiles of short-length, non-pigmented, occasionally branching, and rarely septic fungal hyphae of variable width (approx 4 to 14 µm in diameter; Figure 3). The hyphae were surrounded by thick, non-parallel, irregularly wavy walls (Figure 4). Fibroblasts and endothelial cells had prominent plump nuclei, and submucosal vessels were markedly congested. Regional hyperplasia and squamous metaplasia of overlying ciliated pseudostratified columnar nasal epithelium were also present. The cortex of the cranial cervical lymph node was thickened by numerous secondary reactive follicles that were surrounded by prominent paracortical zones. Results of fungal culture of specimens of nasal mucosa confirmed the identity of the organism as *Conidiobolus coronatus*.

**Morphologic Diagnosis**

Severe chronic diffuse pyogranulomatous, necrohemorrhagic, and eosinophilic rhinitis with intraleisonal fungal hyphae (morphologically consistent with *Conidiobolus spp*).

**Comments**

*Conidiobolus spp* and *Basidiobolus* spp are saprophytic fungi of the class Zygomycetes and order Entomophthorales. *Conidiobolus coronatus* is associated with nasal entomophthoromycosis in horses but can also cause lesions on the facial skin and in the retropharyngeal area, retrobulbar space, brain, maxillary sinus, gullet pouches, and trachea. *Conidiobolus coronatus* infections are mostly limited to tropical and subtropical climates. In contrast to members of the order Mucorales (*Mucor, Absidia*, and *Rhizopus spp*) that cause zygomycosis in immunocompromised animals, members of the order Entomophthorales affect immunocompetent animals. In the horse of this report, pathological changes suggestive of immunosuppression, including concurrent infection or metabolic diseases, were not evident. Because the lesions were restricted to only the right nasal cavity, an initial traumatic injury was suspected, but no foreign body was observed either grossly or histologically. Infections with...
Conidiobolus spp, Basidiobolus spp, and Pythium insidiosum are traditionally grouped together as phaeohyphomycosis because of similar clinical signs. Moreover, these organisms have similar histologic characteristics and morphology; therefore, fungal culture is required for definitive identification.

Common clinical signs of nasopharyngeal Conidiobolus infection are nonspecific and include serosanguineous mucopurulent nasal discharge and dyspnea and abnormally noisy respiration secondary to the narrowing of nasal and nasopharyngeal passages associated with development of underlying fibrosis and inflammation. The gross lesions in the nostrils and surrounding skin are typically composed of necrotizing, ulcerating, and cavitating granulomas with serosanguineous exudate that contains small, gritty, yellow-white, coral-shaped granules known as kunkers or leeches. Kunkers associated with Conidiobolus and Basidiobolus infections are smaller than those associated with Pythium infections. In addition to the ulcerated mucosa, the nostrils, nasal cavity, and nasopharynx may also contain pedunculated nodules. Histologically, areas of pyogranulomatous, necrotizing, and eosinophilic inflammation with multinucleated giant cells, fibrosis, and Splendore-Hoepli bodies often surround the hyphae. Splendore-Hoepli bodies are currently considered a result of precipitation of immune complexes. Conidiobolus coronatus hyphae are nonpigmented, broad (5 to 12.8 µm in width), thin walled, occasionally septate, irregular in contour, and irregularly branched. Although the morphology of Basidiobolus and Pythium organisms and patterns of infection-associated inflammation are nearly identical to those of Conidiobolus spp, the hyphae of Basidiobolus spp are slightly larger (5 to 20 µm in diameter) and Pythium hyphae are more narrow (2 to 7 µm in diameter), thick walled, and infrequently septate. In Pythium-infected animals, lesions are commonly located on the distal portion of the limbs and the ventral aspect of the trunk. In tissue sections, the cosinophilic sleeve surrounding Conidiobolus organisms is thicker than that which surrounds Pythium organisms. In contrast to C. coronatus, the hyphae of fungi that cause phaeohyphomycosis are pigmented and Aspergillus hyphae are nonpigmented, septate, and 2 to 6 µm in diameter, with dichotomous branching. Fungal isolation of C. coronatus is required for definitive diagnosis because immunohistochemical and serologic analyses are not currently available. Similar inflammatory changes develop in association with habronemiasis and mast cell tumors. However, both of those diseases are easily differentiated histologically from infection with Conidiobolus spp by the presence of nematode larvae and neoplastic mast cells, respectively, and the absence of fungal organisms.

Several treatment protocols for nasopharyngeal conidiobolomycosis in horses have been evaluated, including complete surgical excision, debulking of infected tissue with intraleisonal injection of amphotericin B,2 intraleisonal injection of amphotericin B with adjunct sodium iodide or potassium iodide,3 and oral administration of fluconazole.4 Oral treatment with itraconazole alone is considered ineffective.5

References