Presumed Sterile Eosinophilic and Granulomatous Mural Folliculitis and Furunculosis in an Angora and Pygmy Crossbreed Goat

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Abstract: Presumed sterile eosinophilic and granulomatous mural folliculitis and furunculosis was diagnosed in a goat. Dermatological findings included widespread, nonpruritic, bilaterally symmetrical exudation, crusting, alopecia, and thickened skin. Infectious causes were ruled out by negative histochemical stains and negative PCR for ovine herpesvirus-2 conducted on skin-biopsy specimens. There was a 50% reduction in the severity of the dermatitis with intramuscular injections of dexamethasone. A cause for the skin condition was not determined.

Key words: goat, mural folliculitis, skin

Case report

Introduction

Granulomatous mural folliculitis is a rare clinicopathological syndrome in domestic animals.⁵⁻⁷ It is usually associated with presumed adverse cutaneous drug reactions. A single case was reported in a goat infected with ovine herpesvirus-2.² The purpose of this article is to report a second case of granulomatous mural folliculitis in a goat.

Case Report

A 1.5-year-old, intact male, Angora and Pygmy crossbreed goat weighing 23 kg was presented for a 3-week history of a severe, widespread, nonpruritic, bilaterally symmetrical dermatological condition. Skin lesions included exudation, crusting, and alopecia on the ventral abdomen, scrotum, legs, perineum, face, and pinnae. The goat was housed with 15 other animals including 2 llamas, 2 alpacas, 2 horses, 2 chickens, and 7 other goats. All of the other animals were clinically
Granulomatous mural folliculitis in a goat

The goat was up-to-date on *Clostridium* and tetanus vaccinations, was receiving a nutritionally-complete diet, and had free access to a mineral mix for goats. The goat had come from the west coast of the United States at 6 months of age and had lived in the northeastern United States for 1 year.

Initial treatments included topical avermectins, pyrethrins, chlorhexidine shampoo, and injectable oxytetracycline, and resulted in no clinical improvement. The specifics (product names, dosages, frequencies of administration, duration of treatment) of the various therapeutic interventions were not available.

Skin biopsies were obtained and submitted to the New York State Animal Health Diagnostic Center (NYSAHDC) at Cornell University. Histopathologically, 75% of the hair follicles had large numbers of intramural and luminal eosinophils. The intramural eosinophils were accompanied by intercellular edema and mucin, and lesser numbers of lymphocytes, histiocytes, and multinucleated histiocytic giant cells with up to 50 nuclei (Fig. 1). Hair follicles exhibited orthokeratotic and parakeratotic hyperkeratosis with large numbers of degenerate inflammatory cells and multifocal serum lakes extending into the surface stratum corneum. Periodic acid Schiff and Gomori’s methenamine silver stains were negative for fungi. A Gram stain was negative for bacteria. Occasionally, hair follicles were ruptured (furunculosis) with large numbers of perifollicular eosinophils, lymphocytes, and histiocytes.

The superficial and middle dermis were diffusely infiltrated with perivascular and interstitial eosinophils and lesser numbers of lymphocytes and histiocytes. The epidermis was moderately hyperplastic, irregular and mildly papillated, with marked compact orthokeratotic and parakeratotic hyperkeratosis (Fig. 2). There was multifocal epidermal spongiosis with mild lymphocytic and eosinophilic exocytosis.

Following the initial biopsy results, the possibility of ovine herpesvirus 2 (OvHV-2) infection was raised, and samples of formalin-fixed, paraffin-embedded tissue were submitted to the Washington Animal Disease Diagnostic Laboratory (WADDL). Polymerase chain reaction (PCR) testing for OvHV-2 was negative. The final histological diagnosis was eosinophilic and granulomatous mural folliculitis and furunculosis.

Because the dermatitis was presumed to be sterile and immune-mediated, the goat was given an immunosuppressive dose (0.35 mg/kg) of dexamethasone injectable solution intramuscularly, twice daily for 2 weeks, then once daily for another 2 weeks. This treatment resulted in an approximately 50 percent reduction in the severity of the dermatitis. Treatment became sporadic and was discontinued due to difficulty in catching the goat. The skin lesions then worsened. The owner elected to have the goat euthanized.

A complete post-mortem examination was performed at the NYSAHDC. Lesions were limited to the skin. There was generalized thickening of the skin with severe crusting and small amounts of serous discharge.
The crusts were thick and pale yellow-to-white, with multiple fissures in the most severely affected areas, especially the scrotum and legs. There was moderate scale and crust on the dorsal trunk, and hair was easily epilated. The skin of all 4 limbs was severely thickened with horizontal fissures over flexural areas (Fig. 3). Marked crusting was also present periocularly (Fig. 4) and on the proximal half of the medial surface of both pinnae. The scrotum (Fig. 5) was the most dramatically thickened, with the skin measuring up to 4 mm and the surface crust up to 2 mm.

Histopathological examination of the skin revealed the changes described for the initial skin biopsies. Fresh liver and skin samples were submitted to WADDL for PCR for OvHV-2 and were negative. Liver tissue was also submitted for mineral analysis for copper, iron, and zinc concentrations, all of which were in the normal ranges. A final diagnosis of presumed sterile eosinophilic and granulomatous mural folliculitis and furunculosis was made based on the lack of detection of infectious agents and the goat’s clinical improvement with glucocorticoid treatment.

Discussion

The most remarkable clinical features of this case were widespread, bilaterally symmetrical, nonpruritic, severe crusting, and alopecia. Clinical differential diagnosis for this presentation in a goat include dermatophilosis, bacterial folliculitis and furunculosis, contagious viral pustular dermatitis (contagious ecthyma), zinc-responsive dermatitis, pemphigus foliaceus, and chorioptic mange. These etiologies were largely excluded based on histopathology, negative histochemical stains for infectious agents, and lack of response to previous treatments. Although fungal and bacterial cultures were not performed, special stains were negative for fungi and bacteria. The intracytoplasmic inclusion bodies in keratinocytes so typical of parapoxvirus infection were not seen. Mites were not detected in biopsy specimens, and there was no improvement with topical avermectins. Histopathological findings were not consistent with pemphigus foliaceus (no keratinocyte acantholysis) or zinc-responsive dermatitis (no diffuse parakeratotic hyperkeratosis; liver zinc concentrations were normal).

The cause of the skin lesions in this goat is considered
to be sterile and immune-mediated. An infectious cause is most unlikely, given the lack of systemic lesions, the absence of organisms in skin-biopsy specimens, and the clinical improvement with immunosuppressive doses of glucocorticoids. In addition, no other animals on the farm were affected.

Granulomatous mural folliculitis is rarely reported in domestic animals\(^3,4,7\). This lesion, with prominent multinucleated histiocytic giant cells and eosinophils, has been reported in one other goat with scaling and crusting of the pinnae, nares, and buccal skin\(^1\). It also had multifocal erythematous papules, particularly on the distal limbs, which progressed to generalized erythema with localized scaling and thinning of the hair coat. OvHV-2 was detected via real-time PCR on formalin-fixed, paraffin-embedded skin samples. However, the significance of this positive PCR result is unknown as goats can be infected asymptomatically with OvHV-2\(^5\).

A necropsy was not performed, thus evidence of arteritis in internal organs and other characteristic malignant catarrhal fever histopathological lesions could not be evaluated\(^5\).

The etiopathogenesis is unknown in the majority of cases of granulomatous mural folliculitis reported in domestic animals. Adverse cutaneous drug reactions are the most common presumed cause of granulomatous mural folliculitis in dogs\(^4,7\), cats\(^1\), and horses\(^7\). In the goat reported herein, there was no known history of drug administration, including vaccinations, that closely preceded the onset of skin disease.

Granulomatous mural folliculitis is also described in horses with linear alopecia\(^8\). This is a visually distinctive dermatitis in horses in which there are circular areas of alopecia, usually in a linear, vertically-oriented configuration on the neck, shoulders, and/or lateral thorax. The cause and pathogenesis are unknown. The dermatitis in the goat reported herein was not consistent with equine linear alopecia.

In conclusion, in addition to OvHV-2 infection, an immune-mediated reaction should be considered in cases of eosinophilic and granulomatous mural folliculitis in goats. Adverse cutaneous drug reactions should be suspected. This goat had a transient improvement with glucocorticoids, and it is unknown if complete resolution of clinical signs could have been achieved with prolonged immunosuppressive or other immunomodulatory therapy.

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