MANAGEMENT OF A MELTING CORNEAL ULCER IN A GREATER ONE-HORNED RHINOCEROS *(Rhinoceros unicornis*)

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Abstract

Keratomalacia has been reported in several companion animal species, often as a sequela to corneal trauma. Corneal insult can result in a significant host inflammatory response and rapidly progressive stromal collagenolysis with or without presence of bacterial infection. Despite aggressive treatment, keratomalacia can result in a loss of stromal architecture leading to perforation, iris prolapse, endopthalmitis, and phthisis bulbi in 24-48 hr. A paucity of information exists on corneal disease in captive nondomestic mammals. This report reviews the application of ophthalmic techniques established in equine and small animal practice to acute keratomalacia in a large captive nondomestic animal, the greater one-horned rhinoceros (*Rhinoceros unicornis*).

Acute unilateral keratomalacia occurred in a 19-mo-old greater one-horned rhinoceros born and raised at the National Zoo in Washington, D.C. and relocated to The Wilds in Cumberland, Ohio on recommendation of the Species Survival Plan and the Rhinoceros Taxon Advisory Group. The corneal disease was presumed secondary to transport-related trauma. An opacity involving 60% of the cornea of the left eye (OS) was identified approximately 48 hr post-shipping. Twenty-four hours after initial observation of the lesion, the opacity had progressed to approximately 80% corneal involvement with significant epithelial and stromal degeneration evident as a "dripping" appearance to the cornea. An ophthalmic examination was performed under sedation following remote i.m. delivery (Pneu Dart Inc., Williamsport, PA 17703) of 0.5mg etorphine hydrochloride (M99-Ten™, Wildlife Pharmaceuticals Inc., Ft. Collins, CO 80524) and 8 mg detomidine HCl (Dormosedan® , Pfizer Inc, West Chester, PA 19380). Medical treatment consisted of 0.2 ml topical ciprofloxacin HCl (Ciloxan®, Alcon laboratories Inc, Fort Worth, TX 76134) every 2 hr as a broad spectrum antibiotic with ability to penetrate the corneal epithelium; 0.2ml topical autogenous serum every 2 hr as an anticollagenase treatment; 0.2ml topical atropine (atropine sulfate ophthalmic solution USP 1%, E. Fougera & Co., Melville, NY 11747) every 8 hr for pain associated with ciliary contraction resulting from anterior uveitis; 1 g flunixin meglumine granules (Banamine®, Schering Corp, Kenilworth, NJ 07033) p.o. every 2 hr to reduce inflammation associated with the keratomalacia process and 30mg/kg sulfamethoxazole and trimethoprim tablets (960 mg USP, Mutual Pharmaceutical Co., Inc. Philadelphia, PA 19124) p.o. every 24 hr as a systemic antibiotic because of the risk of corneal rupture.

A follow up exam was performed by an ophthalmic specialist, 3 days after initial examination, and revealed little improvement. Slit lamp examination findings included the following: keratomalacia involving 80% of the central cornea, 2mm of clear peripheral cornea, 360° 2-mm limbic neovascularization, mild anterior uveitis, and bulbar conjunctival hyperemia OS. In addition, 2-mm temporolateral corneal erosion was present OD, as demonstrated by positive flourescein uptake and associated 1-mm corneal neovascularization extending from the dorsal limbus. This examination yielded a guarded prognosis for sight and appearance OS due to anticipation of a large corneal scar associated with stromal healing. Because response to medical therapy was inadequate, surgery was indicated as the most efficient method for rapid resolution of the keratomalacia process and return of ocular comfort.

The surgical procedure consisted of corneal debridement, which is essential in halting collagenolysis, and advancement of a 360° conjunctival graft. Post-operative treatment consisted of topical atropine every 6 hr for 2 days; flunixin meglumine 1 g, p.o. every 24 hr for 2 wk; topical ciprofloxacin HCl every 6 hr for 2 wk; a 2-wk course of every 8 hr 1% miconazole (Monistat I.V.®, Janssen Pharmaceuticals, St. Joseph, MO 64504) and stall confinement for 3 wk to reduce potential for trauma to the eye. The rhinoceros tolerated treatment and exhibited no discomfort other than occasional rubbing. Surgical therapy resulted in rapid healing and a minimal midcorneal scar with peripheral corneal clarity. Although medical therapy appeared to slow the progression of the lesion in this case, surgical intervention halted progression and brought rapid resolution. Following conjunctival graft trimming 6 wk post-operatively, the globe was intact and visual function was evident. Six months post-operatively, visual function, comfort, and appearance of the eye were dramatically improved.

Although captive wildlife species present their own challenges to therapeutic management, this case report demonstrates that ophthalmic techniques used in domestic species may be applied to nondomestic species such as the rhinoceros. The incorporation of surgical therapy salvaged the eye in this case and is the primary choice for resolution of any case of keratomalacia. Successful resolution of this case was also associated in part with a high degree of patient compliance with medical therapy. The challenges of following the demanding therapeutic regimen for ocular disease in captive nondomestic species is compounded by handling limitations and facilities therefore must be equipped to provide necessary veterinary management. Three immobilizations were necessary for resolution of this case. Each immobilization added risk and expense to therapy. The stress of capture and handling is likely to play a significant role in the results of therapy that must be weighed against the benefits of each treatment.