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Melting keratitis in dogs and cats

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Abstract

Corneal ulcers are the most common ocular disorders encountered in dogs and cats. Melting keratitis is a pathological condition of the cornea that appears when there is an imbalance between proteinases and proteinase inhibitors, components involved in corneal wound healing. Proteolytic enzymes such as collagenases are produced by some bacteria, especially *Pseudomonas* spp., fungi (*Aspergillus* spp.) and also by host neutrophils and by damaged keratocytes.

There are several medical and surgical techniques that can be used in the attempt to restore corneal appearance. This article reviews the treatment options and emphasizes the need for immediate and proper therapy in order to get a good prognosis. The aim of the medical treatment is to sterilize the ulcer with topical and systemic antibiotic therapy and to inhibit the proteinases. Surgery is needed when melting is progressing to offer a support for the damaged cornea.

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1. Introduction

Melting ulcers appear usually as a complication of other types of corneal ulcers and not as a specific group (Brejchova K. et al., 2010; Wang L. et al., 2008). The normal healing process of the cornea involves the combined activity of proteinases and proteinase inhibitors (Gilger BC, 2007). The proteinases are produced by keratocytes, inflammatory cells or microorganisms (bacteria, fungi) and they have the ability of removing devitalized cells and debris from the surface of the cornea.

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The bacteria frequently involved in corneal ulcerative lesions in dogs and cats are *Pseudomonas aeruginosa*, *Staphylococcus* and *Streptococcus* spp. (Dulaurent T. et al., 2014; Pineda-Bolivar F. et al., 2001; Smith VA et al., 2001). When the proteolytic enzymes are in a greater number than the proteinase inhibitors, the corneal stroma becomes gelatinous and liquefied (Fini ME et al., 1998; Wong TT et al., 2002).

In veterinary patients, melting ulcers have usually an infectious cause, but noninfectious causes cannot be excluded. Predisposing factors include corneal trauma, low corneal sensitivity, lagophthalmos, qualitative and quantitative tear film deficiencies, eyelid abnormalities (Fini ME, Girard MT, 1990; Marcon AS et al., 2003).

Depending on the depth of the stromal defect, treatment of melting keratitis can be medical or surgical (Spiess BM. et al., 2014). The medical treatment involves the frequent administration of broad-spectrum antibiotics and antiproteases. To reduce the ciliary muscle spasm that is usually associated with corneal disease, administration of atropine 1% is recommended (Gilger BC., 2007; Ollivier FJ. et al., 2007).

When melting is progressing despite the medical management, surgery is indicated to avoid corneal perforation. There are several surgical techniques that can be used, including third-eyelid flap, conjunctival flaps, biomaterial grafts, or amniotic membrane transplantation (Barachetti L. et al, 2010; Dulaurent T. et al., 2014; Goulle F., 2012). A new treatment modality used in human and veterinary medicine is the corneal collagen cross-linking (CXL), which uses riboflavin and UV-A irradiation to increase corneal stability (Pot S. et al., 2014; Spiess BM et al., 2014).

This article reviews the therapeutical options of melting keratitis in dogs and cats in order to stop the ulcer progression and to regain vision.

2. Research Methods

This study was conducted in the Ophthalmology Department of the Faculty of Veterinary Medicine in Bucharest between January 2014 and February 2015. Of the 230 corneal ulcers diagnosed in dogs and cats during this period of time, 10 were melting.

The affected animals were represented by 3 cats and 7 dogs, all with unilateral progressive corneal ulceration. All the animals were adults, aged between 1.5 and 16 years, with a mean age of 4 years for cats and 8 years for dogs.

Pretreatment testing included examination with a light source and a magnifying loupe, Schirmer tear test, fluoresceine staining and photography in order to evaluate the clinical progress. For the patients that haven't received any treatment before coming to our clinic, cytology was also performed.

Diagnosis of corneal melting was based on the changes in corneal appearance, the defect in the corneal stroma and the presence of liquefaction in the ulcer area. Table 1 summarizes the clinical examination for these animals.

Table 1. Signalment and pretreatment patient characteristics

Case	Breed	Age & Gender	Affected eye	Concurrent ocular disease
1	DSH	1.5 yr, M	OS	None
2	DSH	3 yr, M	OS	None
3	Persian	7 yr, F	OS	KCS
4	Shih-Tzu	2 yr, F	OD	Lagophthalmos
5	Shih-Tzu	3 yr, F	OS	None
6	Shih-Tzu	3 yr, M	OS	Ectopic cilia
7	Shih-Tzu	9 yr, M	OS	Pigmentary keratitis, Glaucoma
8	Peckinez	11 yr, M	OD	Lagophthalmos, Uveitis
9	Peckinez	14 yr, F	OS	KCS, Nuclear sclerosis
10	Cross-breed	16 yr, M	OS	KCS, Cataract

DSH: Domestic Short-haired cat; yr: years; M: male; F: female; OD: right eye; OS: left eye; KCS: Keratoconjunctivitis sicca.

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