Corneal Ulcer

Issue Description

An inflammatory condition of the cornea involving loss of its outer layer. It is very common in dogs and is sometimes seen in cats. In veterinary medicine, the term corneal ulcer is a generic name for any condition involving the loss of the outer layer of the cornea, and as such is used to describe conditions with both inflammatory and traumatic causes.

Other Names

Ulcerative Keratitis

Causes

Corneal ulcers are one of the most common eye diseases in dogs. They are caused by trauma, detergent burns, and infections. Other eye conditions can cause corneal ulcers, such as entropion, distichiae, corneal dystrophy, and keratoconjunctivitis sicca (dry eye). There have been at least two cases where corneal ulceration was caused by canine herpesvirus.

Superficial ulcers involve a loss of part of the epithelium. Deep ulcers extend into or through the stroma and can result in severe scarring and corneal perforation. Descemetoceles occur when the ulcer extends through the stroma. This type of ulcer is especially dangerous and can result in perforation.

The location of the ulcer depends somewhat on the cause. Central ulcers are typically caused by trauma, dry eye, or exposure from facial nerve paralysis or exophthalmos. Ulcers in the inferior nasal cornea may be caused by foreign material trapped under the third eyelid. Entropion or distichiae may cause ulceration of the peripheral cornea. Immune-mediated eye disease can cause ulcers at the border of the cornea and sclera.

Symptoms

Corneal ulcers are painful due to nerve exposure, and can cause tearing, squinting, and pawing at the eye. There may also be signs of anterior uveitis, such as miosis (small pupil), aqueous flare (protein in the aqueous humour), and redness of the eye.

An axon reflex may be responsible for uveitis formation — stimulation of pain receptors in the cornea results in release inflammatory mediators such as prostaglandins, histamine, and acetylcholine.

Diagnosis

Diagnosis is through direct observation of the ulcer with the use of fluorescein stain, which is taken up by exposed corneal stroma and appears green. With descemetoceles, Descemet's membrane will bulge forward and after staining will appear as a dark circle with a green boundary, because it does not absorb the stain. Other tests that may be necessary include a Schirmer's test for keratoconjunctivitis sicca and an analysis of facial nerve function for facial nerve paralysis.

Treatment

Treatment of corneal ulcers includes topical antibiotic therapy to prevent infection, and pain medications, including topical atropine to stop spasms of the ciliary muscle. Atropine may decrease tear production and interfere with corneal healing. Superficial ulcers usually heal in less than a week. Deep ulcers and descemetoceles may require corneal suturing, conjunctival grafts or conjunctival flaps, soft contact lenses, or corneal transplant. Topical corticosteroids and anesthetics should not be used on any type of corneal ulcer because they prevent healing and will

often make them worse.

Corneal Healing

An ulcer of the cornea heals by two methods: migration of surrounding epithelial cells followed by mitosis (dividing) of the cells, and introduction of blood vessels from the conjunctiva. Superficial small ulcers heal rapidly by the first method. However, larger or deeper ulcers often require the presence of blood vessels to supply inflammatory cells. White blood cells and fibroblasts produce granulation tissue and then scar tissue, effectively healing the cornea.

Refractory Corneal Ulcers

Refractory corneal ulcers are superficial ulcers that heal poorly and tend to recur. They are also known as indolent ulcers or Boxer ulcers. They are believed to be caused by a defect in the basement membrane and a lack of hemidesmosomal attachments. They are recognized by undermined epithelium that surrounds the ulcer and easily peels back. Refractory corneal ulcers are most commonly seen in middle aged or older dogs and often occur in the other eye later.

Refractory corneal ulcers can take a long time to heal, sometimes months. Topical antibiotics are used continually to prevent infection. Pain medications are given as needed. Loose epithelium is removed with a dry cotton swab under topical anesthesia. This is in order to allow production of normal basement membrane and division of normal epithelium. Often further treatment is necessary, such as a keratotomy, which is superficial cutting or piercing of the cornea. There are two main types used in dogs: multiple punctate keratotomy (MPK) and grid keratotomy (GK). MPK involves making small superficial punctures into the cornea with a needle. GK is more commonly used and involves making parallel and perpendicular scratches in the corneal surface. Usually only topical anesthesia is necessary. By scoring the corneal surface, anchoring points are provided for attachment of new epithelium. Of course, these procedures should only be performed by a veterinarian, particularly one with some experience in this treatment. Complete healing takes about three to four weeks. Keratotomies may lead to corneal sequestration in cats. Other medications have been shown to be useful in topical treatment of refractory ulcers, including glycosaminoglycans such as sodium hyaluronate and chondroitin sulfate, aminocaproic acid, and acetylcysteine.

Commonly Affected Breeds

- Alaskan Malamute
- American Cocker Spaniel
- Boston Terrier
- Boxer
- Brussels Griffon
- Cairn Terrier
- Chesapeake Bay Retriever
- Dachshund
- Bulldog
- German Shepherd Dog
- Golden Retriever
- Irish Setter
- Pekingese
- Poodle
- Rottweiler
- Samoyed
- Silky Terrier
- Springer Spaniel
- Weimaraner
- Welsh Corgi
- West Highland White Terrier
- Wirehaired Fox Terrier

Melting Ulcers

Melting ulcers are a type of corneal ulcer involving progressive loss of stroma in a dissolving fashion. This is most commonly seen in Pseudomonas infection, but it can be caused by other types of bacteria or fungi. These infectious agents produce proteases and collagenases which break down the corneal stroma. Complete loss of the stroma can

occur within 24 hours. Treatment includes antibiotics and collagenase inhibitors such as acetylcysteine and blood serum. Surgery may be necessary.