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Keratoconjunctivitis sicca (KCS)

What is KCS?

Keratoconjunctivitis sicca (KCS), commonly known as "dry eye," describes the changes in the eye which result from lack of tear production.

To understand "dry eye," it is helpful to know how tears help keep the cornea healthy. The cornea is the optically clear portion of the eye that allows entry of light into the eye. Like all living tissue, the cornea requires a supply of oxygen and energy to remain healthy. Oxygen and nutrients are supplied to most tissues by the blood that moves through the area in blood vessels. The healthy cornea has no blood vessels, and if it did it wouldn't be clear, so the oxygen and nutrients are supplied through the three-layered tear film.

The outer-most layer of the tear film is an oily layer supplied by glands in the eyelids. This layer helps prevent evaporation of the next, aqueous layer. The middle layer is the liquid aqueous layer produced by the main tear gland and a gland in the third eyelid. This is the layer that is decreased in dry eye. The innermost layer in direct contact with the cornea is a mucous layer produced by glands located in the folds of the eyelid. The mucus layer helps the aqueous adhere to the surface of the cornea.

A breakdown in any component of the tear film and a loss of the aqueous layer causes dry eye. This loss results in dryness to areas of the corneal surface or, in more advanced cases, drying of the entire corneal surface. When the cornea is deprived of oxygen and nutrients through the tear film, it rapidly undergoes destructive changes. These changes result in brown pigmenta-tion, scar tissue growth, ulcer development, and blood vessel growth across the cornea leading to partial vision loss.

The eyes of a patient with KCS sting constantly, just as ours do on a very windy day. The stinging we feel is due to the wind drying our eyes quicker than tears can be provided. Therefore, the patient with dry eye is uncomfortable almost all of the time.

When a patient has "dry eye" where there is a lack of the watery layer of the tears, the oil and mucus layers are increased. This leads to a thick, mucoid, greenish discharge that sticks to the hairs around the eye. Often this is the main reason that a patient is presented to the veterinarian. The discharge will clear up whenever any medication is used but will return when the medication is stopped. When this occurs, the patient is often referred to a veterinary ophthalmologist for further examination and treatment.

How is KCS diagnosed?

Diagnosis is made by collecting a history about the condition, an examination, and a number of testing procedures. These tests include the Schirmer tear test, which measures the production of watery layer. Fluorescein stain is used to define possible breaks in the corneal surface and the tear film break up time.

What are the causes of KCS?

A number of causes have been reported for dry eye. These include hypothyroidism, infections of the tear glands such as canine distemper virus and immune-mediated diseases that attack the tear glands. Another frequent cause of dry eye is a toxic effect produced by certain sulfa-containing drugs and certain anti-inflammatory drugs. Some of these drugs may be necessary for the treatment of other diseases. In some cases, changing or stopping the medication may result in improvement of the dry eye, while in others the toxic damage is done, the KCS is not reversible, and it must be managed medically. In many cases the cause of dry eye remains unknown, yet treatment can still be instituted. Loss of nerve im-pulses to the gland due to long-standing ear infections and other nerve disorders will cause a unilateral (one-sided) dry eye often combined with a dry nose in some cases.

What is the treatment of KCS?

There are several objectives in treating dry eye, including:

- **Tear replacement**
  Since the aqueous tear fraction is absent or reduced, tear replacement is very important. Natural tear production is continuous, so it is very difficult to replicate this with drops. Most owners with a bit of coordination with family members can manage to apply artificial tears 4 to 6 times daily. Commercial tear replacement products such as GenTeal Gel Severe or I-drop Vet are suitable because they are longer lasting than artificial tears.
- **Reduce bacterial overgrowth**
  The dry eye patient frequently has a build-up of mucus in the folds of the eyelids that is no longer being washed with liquid tears. This mucus is food for bacterial growth. These bacteria may not be disease-causing bacteria but need to be controlled.
- **Reduce inflammation**
  Topical anti-inflammatory drugs are indicated when the fluorescein dye test shows no ulceration. This medication reduces inflammation and long-term scarring effects. Corticosteroids (cortisone drugs) cannot be used when ulcers are present because they decrease healing speed and enhance the ulcer process.
- **Stimulate natural tear production**
  Immune-suppressing medications such as Cyclosporine or Tacrolimus increase tear production by decreasing the body's nature immune response which is directed towards the tear gland. Oral pilocarpine may be recommended in cases of neurogenic KCS (dry eye resulting for deinnervation of the tear gland).

Surgical Treatment

Surgical treatment for patients that are unresponsive to at least eight weeks of medical therapy may include a parotid duct transposition. The parotid salivary duct is dissected from the mouth and inserted inside the lower eyelid. The flow of salivary fluid is now deposited onto the eye. Because of the higher concentration of minerals in saliva, compared with tears, mineral deposits onto the cornea or eyelids may occur. An overabundance of salivary secretions may result in facial wetting and discoloration.

Can KCS lead to vision loss?

Untreated KCS can result in blindness. Most patients with dry eye will do well if medications are administered on a timely basis. In general, with good owner compliance, no patient needs to lose eyesight due to KCS.