

# Complicated Corneal Ulcers

## Ophthalmology Service



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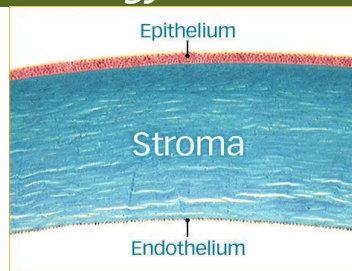
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### Anatomy of the cornea

To better understand corneal ulcers, it is important to understand the structural anatomy of the cornea.

- **Epithelium** - The outermost protective barrier of the cornea.
- **Stroma** - This is the thickest layer of the cornea with a highly structured anatomy which allows the cornea to be clear.
- **Endothelium** - The innermost layer of the cornea is only one cell layer thick. Between the stromal and endothelial layers is a thin membrane called **Descemet's membrane**.



### Clinical Signs

- Squinting
- Increased tearing
- Redness
- Pain
- Blue color to cornea
- Cloudiness of the eye
- Divot in eye

### What is a corneal ulcer?

A corneal ulcer is caused by the loss of a portion of the corneal epithelium. In the case of a **simple corneal ulcer**, the remaining epithelium will slide over the defect and heal the ulcerated area in a few days.

In the case of a **complicated corneal ulcer**, part or all of the underlying stroma is also lost. These ulcers are categorized by depth including **superficial stromal ulcers** (<50% loss of stroma) and **deep stromal ulcers** (>50% loss of stroma).

### Treatment of Corneal Ulcers

The treatment of ulcers depends on the depth. **Superficial stromal ulcers** are usually managed with intensive **medical therapy**. Cytology and/or culture may be indicated to identify any bacteria present. Medical therapy consists of topical antibiotics (several times daily), topical atropine to dilate the pupil and artificial tear supplementation.

**Deep stromal ulcers** and **descemetocelles** are usually treated surgically, most commonly with a **conjunctival graft**. In this procedure, a piece of the conjunctiva (the pink portion around the globe) is sutured over the defect in the cornea. The graft provides structural and nutritional support to the healing corner. Medical therapy is also necessary after surgery, though often with a lower frequency of administration.

### Complications of Corneal Ulcers

Complicated corneal ulcers can lead to significant corneal scarring. As with any disease, early treatment is the key to decreasing scar formation. After the ulcer has healed, medications may be recommended to decrease corneal scarring. In most cases, artificial tear supplements will be used on a permanent basis to prevent recurrence. Early aggressive treatment can preserve vision in most patients.

### Complicating Factors

Complicated corneal ulcers begin as a simple corneal ulcer. Once the protective epithelial layer is gone, the ulcer may become infected with bacteria. The bacteria produce degrading enzymes that break down the cornea. This condition is called a **melting ulcer**, due to the rapid destruction of the cornea. These ulcers can rapidly progress deep into the corneal stroma and may extend down to Descemet's membrane, termed a **descemetocoele** and may even cause **corneal perforation**.

Ulcers may also become complicated by a concurrent ocular condition. **Keratoconjunctivitis sicca (dry eye)** may prevent proper healing of a simple corneal ulcer, thus leading to a complicated ulcer. Abnormally located eyelashes (distichia, ectopic cilia) or abnormally oriented hairs (trichiasis) can rub the cornea, causing continued ulceration. The eyelashes may also be misdirected due to an eyelid abnormality known as **entropion**, where the eyelid rolls in toward the cornea.

Corneal ulcers may develop in any breed, but dogs with short faces and prominent eyes (including Pugs, Lhasa Apsos, Shih Tzus, Boston Terriers, etc.) are at greater risk due to increased corneal exposure and decreased corneal sensitivity. These dogs often blink incompletely or sleep with their eyes open, decreasing the spread of tear film. In addition to lubricating the cornea, the tears also have an antimicrobial quality that prevents infection.