Corneal Ulcer Classification & Early-Support Guide

An initially uncomplicated corneal ulcer can remain stable and heal predictably, or it may progress into a more complex lesion. practical guide to recognizing three possible progression paths, identifying early warning signs, and understanding where biologic support may fit within a complete treatment plan.

Path	What is happening	Clinical direction
A. Normal resolution	Epithelial cells migrate, attach, and restore the surface.	Defect contracts; comfort improves.
B. Delayed healing	The epithelium fails to attach or the underlying problem persists.	The ulcer remains superficial but open.
C. Deterioration	Proteolytic activity begins degrading corneal stroma.	The ulcer deepens and may become urgent.

The Stain Is a Snapshot—not a Forecast

Two fluorescein-positive corneal ulcers can look remarkably similar at the initial examination. Yet one may close predictably, another may remain open, and another can begin losing stromal tissue rapidly.

A positive fluorescein stain identifies an epithelial defect. It does not, by itself, reveal the biological environment beneath that defect or reliably predict the path the ulcer will follow.

- Cause and duration of the injury
- Depth, location, and epithelial adhesion
- Tear-film and ocular-surface health
- Microbial and inflammatory activity
- Patient age, breed, anatomy, and exposure
- Response to initial treatment and the first recheck

CLINICAL NOTE

The initial examination tells you where the ulcer is. The recheck helps reveal which path it is following.

A. The Cornea Resolves Normally

In an uncomplicated ulcer, epithelial cells migrate across the defect, attach to the underlying corneal surface, and re-establish the protective barrier. When the cause is identified and appropriate treatment is initiated, the clinical course is often relatively predictable.

- The fluorescein-positive area becomes smaller
- Ocular discomfort, tearing, and blepharospasm improve
- The epithelial surface closes
- Stromal integrity remains stable

Even when the defect appears uncomplicated, the examination should look beyond size alone:

- Is the ulcer truly superficial?
- Are the epithelial margins firmly adherent?
- Is the stroma clear and structurally stable?
- Is tear production adequate?
- Is hair contact, exposure, foreign material, or eyelid disease contributing?
- Is there a defined recheck interval?

PRACTICAL TAKEAWAY

An uncomplicated appearance is reassuring—but maintaining the conditions that allow normal healing is still an active clinical objective.

B. The Cornea Fails to Heal

Some superficial epithelial defects do not progress toward normal closure. In spontaneous chronic corneal epithelial defects (SCCEDs), the epithelium may migrate but fail to adhere appropriately to the underlying cornea. These ulcers can look shallow and nonurgent while persisting for weeks.

- Loose or nonadherent epithelial margins
- Fluorescein undermining beneath the epithelium
- Minimal stromal loss
- Persistent discomfort
- Failure to improve with routine topical treatment
- Middle-aged or older canine patient; breed predisposition may be present

Eye serum may provide biologic components associated with ocular-surface support, but it does not correct the adhesion abnormality responsible for a SCCED. Debridement, diamond-burr treatment, grid keratotomy, or another specialist-directed intervention may be needed.

Evidence note: In a randomized clinical study, heterologous serum was well tolerated in dogs with SCCEDs but did not significantly shorten re-epithelialization time when added to standard therapy. View the JAVMA study

PRACTICAL TAKEAWAY

A superficial ulcer that remains open may represent a different biological and structural problem—not simply an uncomplicated ulcer that needs more time.

C. The Cornea Begins to Deteriorate

Some ulcers progress from an epithelial defect to active stromal degradation. During keratomalacia (corneal melting), collagen and other stromal components are broken down by proteolytic enzymes originating from microorganisms, inflammatory cells, epithelial cells, or stromal cells.

- Soft, gelatinous, or malacic stroma
- Increasing opacity or cellular infiltrate
- Rapidly increasing depth
- Loss of structural integrity
- Descemetocele formation or perforation

These cases require immediate recognition, aggressive treatment, frequent medication, close reassessment, and referral or surgical stabilization when appropriate.

Antiprotease support

Management is not limited to controlling microbial involvement. Excessive proteolytic activity must also be addressed. Topical serum is commonly used as one component of anticollagenase or antiprotease therapy because it contains naturally occurring protease inhibitors, including alpha-2 macroglobulin. Other options may include EDTA, N-acetylcysteine, tetracyclines, and specialist-directed surgical therapy.

Further reading: Anticollagenase Therapy for Canine Corneal Ulcers

PRACTICAL TAKEAWAY

A melting ulcer is not simply a deeper uncomplicated ulcer. It reflects a shift from tissue repair toward active tissue destruction.

Treating the Organism and Supporting the Cornea

When microbial involvement is present or suspected, appropriately selected antimicrobial therapy remains central. Eye serum may contribute biologic, antiprotease, and antibacterial activity, but it is not a substitute for antibiotics.

Research led by veterinary ophthalmologist Melissa Kubai, DVM, MS, DACVO, demonstrated that topical blood products can affect both bacterial growth and the measured activity of ophthalmic antibiotics. The interactions varied by bacterial organism, antibiotic, donor species, blood-product type, and storage condition.

CLINICAL PRINCIPLE

Antibiotics and eye serum may serve complementary roles, but administration sequence and timing matter.

Practical administration consideration

In the Kubai study, the authors recommended administering blood products last, at least 15 minutes after the final antibiotic drop, to reduce protein-related antibiotic binding in the tear film. Treatment timing should be incorporated into the complete medication schedule, particularly in cases requiring frequent topical therapy.

Autologous vs. Frozen

Fresh and frozen blood products did not differ significantly in proteomics or antibacterial efficacy under the study conditions. This supports frozen storage as a practical method of preserving the properties evaluated in vitro. It does not, by itself, prove equivalent clinical outcomes in every ulcer type.

Read the study: Kubai et al., Frontiers in Veterinary Science (2024)

Important scope note: Dr. Kubai's study evaluated canine and equine serum and plasma, not bovine serum or SeroLube specifically. Its strongest contribution to this guide is the broader evidence that blood-derived ocular products are biologically active, serum and plasma are not necessarily interchangeable, frozen storage can preserve measured activity, and medication sequencing matters.

Why the First Examination Matters

The stain confirms that an epithelial defect is present. The remainder of the examination helps determine whether the cornea appears positioned for normal healing—or whether risk factors are present for delayed healing or deterioration.

Evaluate	Look for
Epithelium	Adherent vs. loose margins; undermining; shape and distribution; recurrent defects
Stroma	Depth; edema; infiltrate; softening; malacia; vascular response; descemetocele
Ocular surface	Schirmer tear test; eyelid function; exposure; hair contact; tear-film quality; foreign material
Patient factors	Age; breed; skull conformation; systemic disease; treatment adherence; duration of injury

The First Recheck Is Part of the Diagnosis

Some ulcers reveal their true behavior only over time. A planned recheck helps determine whether:

- The epithelial defect is contracting
- Depth remains stable
- Pain and inflammation are improving
- The stroma remains structurally sound
- Discharge or infiltrate has developed
- The ulcer is failing to re-epithelialize
- Treatment should continue, change, escalate, or be referred

Where Eye Serum Fits

Eye serum contains a complex mixture of biologic components associated with epithelial health, ocular-surface protection, and the natural healing environment. These may include growth factors, fibronectin, vitamin A, immunoglobulins, lysozyme, albumin and other proteins, and proteinase inhibitors.

Conventional lubricant	Eye serum
Primarily reduces friction, improves hydration, and provides comfort.	Adds serum-derived biologic and antiprotease components to ocular-surface support.

Early Biologic Support

Corneal healing begins as soon as the ocular surface is injured. During that early phase, epithelial repair, inflammation, microbial activity, and protease regulation may all influence the direction of the case—sometimes before visible deterioration is apparent.

Introducing eye serum early, when clinically appropriate, allows biologic and antiprotease support to be incorporated from the beginning of treatment rather than reserved only for advanced disease. Immediate access also makes it possible to add serum without delaying care for blood collection and in-clinic preparation.

Current evidence supports eye serum as a generally safe and biocompatible adjunct in veterinary corneal disease. A 2026 systematic review recognized its biologic rationale and favorable safety profile while noting that clinical benefit can vary by ulcer type, treatment protocol, and outcome measured. The review also highlighted the need for additional controlled research to better define the cases in which serum provides the greatest benefit.

View the systematic review

A retrospective study of 252 infected canine corneal ulcers similarly found that topical serum could be incorporated into complex medical and surgical treatment protocols without negatively affecting healing time, visual outcome, or globe retention. Because the cases varied widely in severity and treatment, the study was not designed to isolate the effect of serum alone. Its findings support viewing serum as one component of a comprehensive treatment plan rather than as a stand-alone therapy.

View the study

What Eye Serum Does Not Replace

- A complete ophthalmic examination and fluorescein staining
- Tear testing when appropriate

- Identification and correction of the underlying cause
- Appropriate antimicrobial therapy and culture when indicated
- Pain management
- Mechanical treatment of indolent ulcers
- Close rechecks
- Surgical stabilization
- Referral to a veterinary ophthalmologist

CLINICAL PEARL

Different therapies solve different parts of the problem. Eye serum adds biologic and antiprotease support within—not instead of—a complete treatment plan.

A Practical Treatment Perspective

Clinical path	Primary considerations	Possible role for serum
Apparently uncomplicated	Identify/correct cause; appropriate topical therapy; pain control; prevent self-trauma; defined recheck.	May be considered as an early adjunct when biologic support is clinically appropriate.
Persistent superficial ulcer	Evaluate loose epithelium and adhesion disorder; debridement or procedural treatment; referral as needed.	May support the surface but should not be expected to correct defective adhesion alone.
Stromal or melting ulcer	Aggressive therapy; culture/cytology when indicated; antimicrobials; antiprotease treatment; close reassessment; early referral.	May be one component of an antiprotease and biologic-support strategy, not stand-alone treatment.

The Central Clinical Principle

REMEMBER

Not every uncomplicated ulcer becomes complicated. But every complicated ulcer began somewhere.

Early classification does not guarantee that every complication can be prevented. It does allow the clinician to recognize risk earlier, support the ocular surface, initiate appropriate therapy, and detect a changing clinical course before more advanced deterioration occurs.

Recognize the healing path. Support the cornea from the beginning.

About SeroLube

Traditionally, adding serum to a treatment plan may require a patient blood draw, clotting or processing time, centrifugation, serum transfer, aliquoting, labeling, and risk of contamination.

SeroLube is a ready-to-use frozen eye serum that can remove that workflow barrier, making it more practical to begin serum support when the veterinarian determines that it fits the case.

SeroLube is a veterinarian-directed frozen eye-serum option intended to provide immediate access to serum-based biologic support without in-clinic serum production. Its availability does not change the need for appropriate diagnosis, medication, rechecks, or referral. It changes how quickly and practically serum can be incorporated when clinically appropriate.

Selected Clinical References

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Educational use notice

This guide is intended for veterinary professional education and does not replace clinical judgment, a complete ophthalmic examination, product labeling, consultation with a veterinary ophthalmologist, or patient-specific treatment decisions.