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Clinical Outcomes of Autologous Serum Eye Drops in Treating Corneal Ulceration in a Domestic Cat: A Case Base Study

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ABSTRACT

Corneal ulceration is a frequent ophthalmic disorder in domestic cats that can cause ocular discomfort, visual impairment, and serious complications if left untreated. Conventional medical management often provides limited support for epithelial regeneration, leading to the need for alternative therapeutic options. This case study reports the clinical outcome of using autologous serum eye drops (ASEDs) in the treatment of corneal ulceration in a domestic cat. A cat presented with severe epiphora, conjunctival hyperemia, and a centrally located corneal ulcer confirmed by fluorescein staining. Autologous serum was prepared by weekly collection of 6 mL of blood from the dorsalis antebrachii vein, followed by centrifugation and aliquoting into sterile eye drop bottles stored at 4 °C. The serum was applied topically twice daily, accompanied by supportive therapy consisting of vitamin A supplementation, multivitamin injections, and an Elizabethan collar to prevent self-trauma. Clinical scoring (0–3) was used to monitor epiphora, conjunctival hyperemia, and corneal opacity over the treatment period. Marked improvement was observed within 14 days: epiphora and conjunctival hyperemia resolved completely, while corneal opacity improved from moderate to mild, with fluorescein staining becoming negative, indicating complete epithelial closure. No adverse effects were recorded during therapy. This case highlights the potential of autologous serum eye drops as a safe and effective adjunct treatment for feline corneal ulceration, warranting further investigation in larger cohorts to establish standardized protocols for veterinary ophthalmology.

Keywords: *autologous serum, corneal ulceration, feline ophthalmology, serum eye drops.*

INTRODUCTION

Corneal ulceration in cats can be caused by various factors, including viral infections such as Feline Herpesvirus-1 (FHV-1), physical trauma, or neurological disorders affecting tear production (Kern, 1990). This condition may progress to deep or chronic corneal ulceration, which requires appropriate medical intervention (SeEun *et al.* 2018; Telle *et al.* 2021).

The use of autologous serum eye drops (ASEDs) in the treatment of corneal ulceration has been widely recognised in veterinary medicine. Serum contains various bioactive components that support the wound healing process, such as growth factors, vitamin A, lysozyme, and epidermal growth factor (EGF) (Farghali *et al.* 2021). Experimental studies have shown that the topical application of serum can accelerate the corneal healing process compared to the use of saline solution or artificial tears (SeEun *et al.* 2018; Quan *et al.* 2023).

In cats, corneal ulceration is often associated with FHV-1 infection, which can lead to keratitis and ulceration of the cornea that is difficult to heal (Belknap *et al.* 2015). Conventional therapies, such as the use of antibiotics or antiviral agents, are often insufficient to address this condition. Therefore, adjunctive therapies such as serum eye drops are crucial to accelerate the healing process and prevent further complications (Farghali *et al.* 2021). In recent years, the use of serum eye drops, both autologous (from the animal's own blood) and heterologous (from a donor), has

emerged as a promising therapeutic alternative (Kyol-Salman, 2016).

Although the use of ASEDs has proven effective in the treatment of corneal ulceration in dogs, its application in cats remains limited. Further studies are required to explore the effectiveness, dosage, and frequency of serum application in cats to ensure the success of this therapy. This article aims to evaluate the use of serum eye drops in the management of corneal ulceration in cats, focusing on clinical aspects, serum composition, and the regenerative therapeutic potential it offers. It is expected that the findings of this study will contribute significantly to the development of corneal ulceration therapies in cats and improve the overall quality of ophthalmologic care for companion animals.

MATERIALS AND METHODS

Anamnesis

A five-month-old male Persian cat was presented to Catnip Pet Clinic with a primary complaint involving the right eye. The cat was otherwise in good general health. According to the owner, the cat had been involved in a confrontation with another household cat several days prior, after which persistent tearing, conjunctival redness, and repeated rubbing of the face against the owner's hands or nearby objects were observed. The medical history revealed no previous ocular disorders, treatments, allergies, or chronic systemic diseases.

Clinical Examination

A systematic physical examination was performed. The patient weighed 1.6 kg, had a body temperature of 38.8 °C, and a respiratory rate of 26 breaths/min (within normal range). Capillary refill time (CRT) was <2 seconds, and the auricular mucous membranes appeared pale, suggesting mild anemia. Ophthalmic examination of the right eye revealed persistent epiphora, conjunctival erythema, corneal vascularization, and a whitish haze on the anterior corneal surface.

A fluorescein test (FT) was performed according to Kartini *et al.* (2017). A fluorescein strip was moistened with sterile saline and applied to the corneal surface, followed by irrigation with saline to remove excess dye. Positive uptake of orange-green fluorescence confirmed the presence of a corneal ulcer.

Diagnosis and Treatment

Based on the clinical and diagnostic findings, a diagnosis of corneal ulceration was established (Telle *et al.* 2021). Autologous serum eye drops (ASEDs) were prepared and administered as the primary treatment (SeEun *et al.* 2018). Six milliliters of blood were collected weekly from the dorsalis antebrachii vein. Samples were allowed to clot at room temperature for 20 minutes, then centrifuged at 3000 rpm for 10 minutes. The serum was collected, transferred into sterile 5 mL eye drop bottles, stored at <4 °C, and applied to the affected eye at two drops twice daily.

Supportive therapy included oral vitamin A supplementation (Nutri-Plus gel), multivitamin injections (Life-Vit and Fertilive), and the use of an Elizabethan collar to prevent self-trauma and minimize further irritation of the affected eye.

Clinical Evaluation

Treatment outcomes were objectively assessed using a clinical scoring system. Three ocular parameters—epiphora, conjunctival hyperemia, and corneal opacity—were graded on a scale of 0–3 (0 = none, 1 = mild, 2 = moderate, 3 = severe), adapted from previous veterinary ophthalmology studies (William *et al*. 2025; Vatnikov *et al*. 2020). Evaluations were performed at baseline (day 0), mid-treatment

(day 7), and at the end of therapy (day 14). In addition, fluorescein testing was repeated during follow-up to monitor corneal epithelial healing and ulcer closure.

RESULTS AND DISCUSSION

Results

The clinical progression of the corneal ulcer was monitored over a 14-day treatment period using serial clinical scoring and repeated fluorescein testing. At presentation (day 0), the cat exhibited severe epiphora (score 3), marked conjunctival hyperemia (score 3), and moderate corneal opacity (score 2). Fluorescein staining was strongly positive, confirming the presence of an active corneal ulcer with evident epithelial disruption.

By day 7, a notable reduction in clinical signs was observed. Epiphora had decreased to a moderate level (score 2), conjunctival hyperemia was mild (score 1), and corneal opacity showed improvement, declining to a mild degree (score 1). Fluorescein staining revealed reduced uptake, indicating partial epithelial healing and a decrease in ulcer size.

At the end of treatment (day 14), clinical signs had improved significantly. Both epiphora and conjunctival hyperemia had resolved completely (score 0), while corneal opacity persisted as mild (score 1), suggesting residual stromal remodeling despite epithelial closure. Importantly, fluorescein staining was negative, confirming complete epithelialization of the corneal surface. No adverse effects associated with the application of ASEDs were observed during the treatment period.

A summary of the clinical scores across the treatment timeline is presented in Table 1. Representative images of the affected eye before and after treatment are provided in Figure 1, illustrating the marked improvement in ocular surface integrity and reduction of clinical symptoms.

Table 1. Clinical scoring of ocular parameters during treatment with autologous serum eye drops.

Day	Epiphora (0–3)	Hyperemia (0–3)	Opacity (0–3)	Fluorescein Test
0	3 (severe)	3 (severe)	2 (moderate)	Positive
7	2 (moderate)	1 (mild)	1 (mild)	Reduce uptake
14	0 (none)	0 (none)	1 (mild)	Negative

Graphic 1. Corneal Ulcer Treatment Outcomes Using Autologous Serum

Discussion

A Corneal ulcer is the loss of corneal tissue that can range from the epithelial layer to the stroma. The depth of the ulcer determines the severity of the corneal ulceration (Duncan, 2019). Corneal ulcers involve a defect in the corneal epithelium and potentially deeper stromal layers. Severity is classified based on the depth of involvement: *superficial* (epithelium only), *superficial stromal* (≤1/3 stroma), *deep stromal* (>1/3 stroma), *descemetocele* (full thickness stromal loss exposing Descemet's membrane), and *perforation* when Descemet's membrane is breached (Kim and Won, 2008). Loss of the entire thickness of the corneal stroma, revealing Descemet's membrane, is termed descemetocele. Corneal perforation occurs if Descemet's membrane ruptures, leading to leakage of aqueous humour (Duncan, 2019).

Corneal healing is a complex, multi-phase process involving epithelial cell migration and proliferation, reattachment to the extracellular matrix, stromal remodeling, and neoangiogenesis (Hartley, 2010). All of these processes require glucose, vitamins, and growth factors (Gadallah *et al.* 2021). Traditional treatments often yield suboptimal outcomes, necessitating alternative approaches. Autologous serum eye drops are a therapeutic product for the treatment of corneal pathology, obtained from the patient's blood, which is centrifuged at high speed to yield serum.

The use of ASEDs has emerged as a promising adjunctive therapy due to their composition, which closely resembles natural tears and includes essential growth factors conducive to corneal healing. (Gadallah *et al.* 2021). Autologous serum contains components such as vitamin A, epidermal growth factor (EGF), lysozyme, and transforming growth factor-beta (TGF-β), which play pivotal roles in epithelial cell proliferation and migration, thereby facilitating corneal wound healing. Studies have shown that serum-based therapies can improve epithelialization and reduce inflammation, essential for the successful treatment of corneal ulcers in both humans and animals (SeEun *et al.* 2018).

In veterinary medicine, both ASEDs and platelet-rich plasma (PRP) have shown efficacy in treating corneal ulcers. A study involving subconjunctival PRP injections in dogs and cats found it effective, safe, and beneficial in reducing matrix metalloproteinase (MMP) activity and oxidative biomarkers, and in promoting healing across various ulcer morphologies (Farghali *et al.* 2021). Research by Guna *et al.* (2023) further supports the efficacy of autologous serum in veterinary ophthalmology, showing that serum eye drops effectively enhance healing in cases of keratitis and ulcers, especially in animals with compromised immune systems or recurrent infections.

The observed clinical improvement in this case aligns with findings from previous studies, underscoring the potential of autologous serum as an effective treatment modality for corneal ulcers in felines. The resolution of epiphora and conjunctival hyperemia, along with the clearing of corneal opacity, are indicative of successful epithelial regeneration and reduction in inflammatory processes. Additionally, studies by Guna *et al.* (2023) have demonstrated that serum eye drops can decrease the risk of recurrence, which is particularly significant in the management of ulcerative keratitis in cats.

In feline cases, a clinical pilot study reported using serum eye drops as adjuvant therapy for refractory herpetic keratitis. In 9 eyes from 7 cats, serum treatment resulted in complete healing of persistent ulcers within an average of 19.3 ± 2.3 days, without relapse over three months. Notably, earlier initiation of therapy correlated with faster

healing (r^2 = 0.895, P < 0.01) (Kim *et al.* 2018).

In the current case, ASED treatment yielded complete resolution of epiphora and hyperemia by day 14, with significant improvement in corneal opacity, confirmed by negative fluorescein staining. This aligns closely with existing data in veterinary literature, supporting ASEDs role in promoting epithelial regeneration and reducing ocular surface inflammation.

Residual mild opacity at day 14 likely reflects the slower pace of stromal repair compared to epithelial healing. This is consistent with clinical observations where stromal clarity often lags behind epithelial closure due to ongoing collagen remodeling. Moreover, no adverse reactions were observed in this case, reinforcing the favorable safety profile of ASEDs in felines. This mirrors safety reports in both human and veterinary contexts.

While the results are promising, it is essential to consider the limitations of this treatment approach. The preparation of autologous serum requires blood collection, which may pose challenges in certain patient populations, especially if the patient is not suitable for repeated venipuncture or if there are complications with blood processing. Additionally, the storage and handling of serum to prevent contamination and degradation are critical factors influencing the efficacy of the treatment. Improper handling of the serum, such as storage at incorrect temperatures, can result in a loss of bioactivity, thus affecting therapeutic outcomes (Lonascu and Seralp, 2020).

CONCLUSION

This case report highlights the potential of autologous serum eye drops (ASEDs) as a safe and effective therapeutic option for the management of corneal ulceration in cats. The treatment resulted in complete resolution of epiphora and conjunctival hyperemia, substantial improvement in corneal opacity, and full epithelial closure confirmed by fluorescein testing within 14 days. These findings support previous evidence that serum-derived growth factors and bioactive components play a pivotal role in corneal surface healing and inflammation control. Although limited by the single-case design, this report demonstrates promising outcomes and underscores the need for further controlled clinical studies with larger sample sizes to establish standardized protocols and expand the use of ASEDs in veterinary ophthalmology.

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