

Case Report
Ophthalmology



Application of superficial keratectomy and soft contact lens for the treatment of symblepharon in a cat: a case report

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Conflict of Interest

The authors declare no conflicts of interest
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ABSTRACT

A 7-month-old intact female Persian cat was diagnosed with symblepharon accompanied by epiphora, brownish ocular discharge, and ocular discomfort in the left eye. Superficial keratectomy (SK) was performed to remove adhesions between the conjunctiva and cornea. To prevent re-adhesion after SK, the detached conjunctival tissue was sutured to the corneal limbus, and a soft contact lens (SCL) was inserted and a partial temporary tarsorrhaphy was performed. The SCL and tarsorrhaphy sutures were maintained for 22 days, and symblepharon did not recur 347 days postoperatively. SK combined with SCL is a relatively easy and cost-effective surgical option for feline symblepharon.

Keywords: Case report; cat; keratectomy; soft contact lens; symblepharon

INTRODUCTION

Feline symblepharon is an adhesion between the bulbar or palpebral conjunctiva, cornea, and third eyelid and is caused by feline herpesvirus type 1 (FHV-1) infection [1,2]. On initial exposure to FHV-1, cats can develop upper respiratory symptoms such as serosal or mucopurulent nasal discharge, fever, and sneezing with ocular symptoms such as hyperemia, chemosis, ocular discharge, and blepharospasm [3]. However, in severe infections, FHV-1 induces cytolysis and ulceration of the conjunctival and corneal mucosal layers [2,3]. These conjunctival and corneal ulcerated surfaces rapidly adhere to each other and form a symblepharon [2,3]. During symblepharon development, the lacrimal punctum becomes obstructed or narrowed and tear drainage system can be impaired [1,3]. Moreover, the eyelids are distorted and vision is partially or completely lost due to corneal opacity or adhesion [2,3].

Surgical treatment performing superficial keratectomy (SK) for symblepharon aims to separate the adhered tissues between the cornea and conjunctiva, maintain the conjunctival epithelial surface and fornix, and restore vision [1]. To prevent recurrence that easily develops after single SK, temporary implants such as amniotic membranes (AMs) [4], soft contact lenses (SCLs) [5,6], methyl methacrylate corneal protectors [1], gelatin sponges [7], mitomycin C [8], and partial limbal stem cell implants [9,10], can be considered for the treatment of symblepharon in human and veterinary ophthalmology.

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Only a few literatures have suggested that an SCL can be applied for feline symblepharon treatment [1,11]. In addition, to the best of our knowledge, no studies have described the application of SCL with SK, including the effect of SCL on preventing the recurrence of feline symblepharon. In this report, we describe the case of feline symblepharon with adhesions of the conjunctiva, cornea, and third eyelid and describe the surgical treatment of symblepharon using the combination of SK and SCL application to prevent symblepharon recurrence.

CASE PRESENTATION

A 7-month-old, 2.2 kg, intact female Persian cat with a 2-month history of excessive tear secretion, brownish waxy ocular discharge, and ocular discomfort with no response to antibiotic eyedrops in the left eye (oculus sinister [OS]) was presented (**Fig. 1A**). Initial ophthalmic examination results were summarized in **Table 1**. Slit-lamp biomicroscopy (SL-D7[®]; Topcon, Japan) revealed corneal edema, distorted upper eyelid margin, and protrusion of third eyelid secondary to the adhesion of the conjunctiva, cornea, and third eyelid in the OS. Direct pupillary light reflex (PLR) was normal in the right eye (oculus dexter [OD]) and invisible in OS, owing to the opacity resulting from adhesion of the conjunctiva and cornea. Indirect PLR from OS to OD was normal, but that from OD to OS was invisible. Hematological and serum biochemical analyses were within the normal reference values. Accordingly, the cat was diagnosed with symblepharon. Because most of the corneal surface was both conjunctivalized and adhered to the adjacent conjunctiva, the surgical plan was to perform SK to separate the conjunctiva adhering to the cornea and place the SCL between the separated cornea and conjunctiva to prevent recurrence of symblepharon with the client's informed consent.

The cat was positioned in dorsal recumbency and lateral canthotomy was performed to increase exposure, and the eyelids were retracted using a Barraquer eyelid speculum to secure

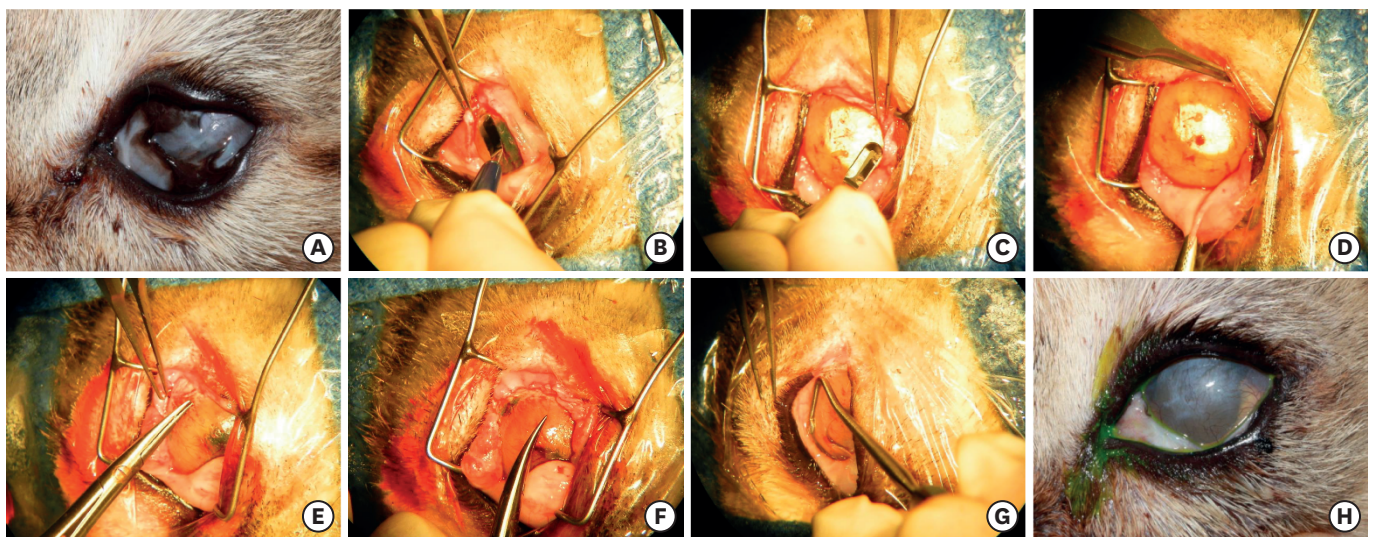


Fig. 1. Pre, peri, and postoperative appearances. (A) Preoperative appearance showing extensive adhesions involving the bulbar and palpebral conjunctivas, cornea, and third eyelid of the left eye. Note the distorted upper eyelid. (B, C, D) Using a crescent corneal knife, the attached tissues, including the conjunctiva and third eyelid, were separated from the entire corneal surface. (E, F) The bluntly separated conjunctival tissues were anchored with a simple continuous suture of 8-0 polyglactin 910 sutures along the corneal limbus. (G) The soft contact lens was positioned and fitted to the limbus suture line using a Jameson strabismus hook. (H) Postoperative appearance of the left eye 347 days postoperatively. Note the persistent mild corneal opacity without recurrence of re-attachment and relief of upper eyelid distortion.

Table 1. Ophthalmic examination results of a 7-month-old intact male Persian cat

Ophthalmic examination	OD	OS
STT-1 (mm/min)	14	18
IOP (mmHg)	16	21
FDT	Negative	Negative
Menace response	Positive	Positive (decreased)
Dazzle reflex	Positive	Positive
PLR		
Direct	Positive	Invisible
Consensual	Positive	Invisible

OD, oculus dexter (right eye); OS, oculus sinister (left eye); STT-1, Schirmer tear test-1; IOP, intraocular pressure; FDT, fluorescein dye test; PLR, pupillary light reflex.

a wider surgical field of view. After creating a superficial midline incision horizontally from 3 to 9 o'clock using a No. 15 surgical blade in the conjunctivalized surface on the cornea, SKs to remove the conjunctivalized surface and separate the conjunctiva from the corneal stroma were performed superiorly and inferiorly from the midline to the corneal limbus using a 2.6-mm crescent microsurgical knife (Kai Medical, Japan) (**Fig. 1B and D**). The adhesion between the palpebral surface of the third eyelid and palpebral conjunctiva was separated using Stevens curved tenotomy scissors. For the reconstruction of the conjunctival fornix, the adhered tissues were further separated caudally from the corneal limbus until 5–6 mm of the sclera was exposed. Then, the bluntly separated conjunctival tissues were sutured to the corneal limbal margin using 8-0 polyglactin 910 (Vicryl[®]; Johnson & Johnson, Germany) with simple continuous sutures (**Fig. 1E and F**). Care was taken to ensure that the subconjunctival tissue did not protrude between the sutures. After completion of suturing, the corneal diameter was measured using a Castroviejo ophthalmic caliper, and a 15.8-mm diameter SCL (Meni-one Corneal-Bandage One[®]; Menicon Nect Co., Japan) of the same size was inserted. Using a strabismus hook, the SCL was evenly pressed to fit tightly between the sutured conjunctival tissues and the corneal limbus (**Fig. 1G**). The lateral canthotomy was sutured with a figure-of-eight pattern using 6-0 nylon (Blue Nylon[®]; Ailee, Korea), and temporary partial tarsorrhaphy was performed using a simple interrupted suture to prevent the SCL from falling. Topical cyclopentolate BID (Ocucyclo[®], Samil Pharm, Korea) was instilled in OS until 8 days postoperatively. Topical 0.5% levofloxacin QID (Eyelevo[®], Kolmar Pharm, Korea) and trifluridine QID (Ocufridine[®], Samil Pharm) were instilled in OS until 22 days postoperatively, and systemic doxycycline (Doxycycline[®], Kukje Pharm, Korea) 5 mg/kg BID was administered for 22 days. An Elizabethan collar was placed on the cat to prevent self-trauma until the sutures were removed 22 days postoperatively. The cat was re-examined 8 and 22 days postoperatively. The temporary partial tarsorrhaphy sutures and SCL were removed 22 days postoperatively. At that time, the cat exhibited enhanced menace response in OS and positive dazzle reflex in the OU. Normal direct PLR and indirect PLR from OD to OS were observed in the OS and palpebral reflex was also confirmed normally in OS. The cat was able to jump up and down on a cat tower and chase a toy better than that preoperatively according to the owner's report. At the final recheck at 347 days postoperatively, there was cosmetic improvement even with continued mild protrusion of the third eyelid, corneal opacity, and corneal vascularization. Neither ocular discomfort nor upper eyelid distortion and re-adhesions among the cornea, conjunctiva, and eyelid were observed (**Fig. 1H**).

DISCUSSION

FHV-1 has high affinity for the respiratory and conjunctival epithelia, replicating in these cells and inducing necrosis and ulceration [12,13]. To a lesser extent, FHV-1 can also replicate in the corneal epithelium, causing corneal ulcers, and approximately 80% of cats are known to have latent infection in the corneal stroma or trigeminal ganglia [12-14]. Clinical signs may recur with herpes virus reactivation and recrudescence caused by stress, including re-homing, overcrowding, introduction of new animals, boarding situations, anesthesia, frequent medications, parturition, or drugs such as corticosteroids. It might also lead to corneal sequestra, stromal keratitis, and eosinophilic keratitis [2,14]. In particular, symblepharons are more commonly associated with primary exposure in kittens and are rare in adult cats [12]. Therefore, if FHV-1 is not appropriately treated in the early stage of primary infection, permanent damage of the epithelium and adhesions may occur, which may reduce the effectiveness of surgical treatment, allowing the frequent recurrence of more severe forms of symblepharons [3]. Therefore, it is recommended to prescribe topical (trifluridine, idoxuridine, vidarabine, and ganciclovir) or systemic (acyclovir and famciclovir) antiviral agents to prevent symblepharon even after surgical treatment [1,2]. However, in the present case, famciclovir was not administered perioperatively because the owner disagreed to the drug prescription due to the side effects, including nephrotoxicity, and high cost; thus, topical trifluridine eyedrop was instilled.

In this case, it was impossible to construct a donor site for limbal stem cells because most of the OS cornea was damaged and conjunctivalized. Although there was an option of creating a corneal stem cell tissue graft from the limbus of the OD and implanting it into the OS, the cat's owner refused surgery on the normal OD. Therefore, after performing SK, the separated conjunctiva was sutured to the corneal limbus, and SCL was inserted tightly between the conjunctiva and cornea to cover the exposed corneal stroma and prevent conjunctivalization of the cornea as much as possible [1,5]. Temporary partial tarsorrhaphy was also performed to retain SCL, protect the surgical site, and reduce irritation from eyelid movement [1].

The SCL is not only known to physically separate the cornea and conjunctiva until epithelialization is complete but also relieves ocular pain [1]. In a human study, the group using SCLs postoperatively to treat the pterygium had reduced postoperative pain and stinging compared with the group that did not use SCLs [5]. SCL has also been reported to reduce the time of corneal re-epithelialization [5]. Grininger et al. [15] suggested that re-epithelialization time with the use of SCLs in dogs was obviously accelerated (mean, 14 ± 0 days) compared with those without SCLs (mean, 36 ± 17 days).

In this case report, on the 22nd day postoperatively, the fluorescein dye test result was negative in OS, confirming complete corneal re-epithelialization and there was no recurrence of symblepharon at the final recheck 347 days postoperatively. The SK combined with intraoperative SCL for the treatment of symblepharon was a relatively easy and cost-effective option, with requiring shorter surgical time and was considered to be effective in preventing recurrence compared with single SK in cats.

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