pISSN 1598-298X / eISSN 2384-0749
J Vet Clin 37(5) : 292-294 (2020)
https://doi.org/10.17555/jvc.2020.10.37.5.292

Journal of Veterinary Clinics
www.ksvc.or.kr

Hyaluronic Acid Subdermal Filler for Correction of Lower Eyelid Entropion in a Cat

Youngsam Kim*,, Seonmi Kang** and Kangmoon Seo**[1]**

**Dana Animal Hospital Eye Center, Seoul 07014, Korea*
***Department of Veterinary Clinical Sciences, College of Veterinary Medicine and Research Institute for Veterinary Science, Seoul National University, Seoul 08826, Korea*

(Received: July 29, 2020 / Accepted: October 13, 2020)

Abstract : A 14-year-old castrated male Persian cat presented with epiphora, blepharospasm, brownish ocular discharge, corneal neovascularization, and corneal opacity in the left eye. Medial lower eyelid entropion was diagnosed through an ophthalmic examination. Since the cat was old and suffered from chronic kidney disease, we decided to perform a hyaluronic acid (HA) subdermal filler injection without general anesthesia rather than surgical correction. After topical anesthesia by lidocaine jelly and disinfection, HA filler was injected into the medial lower eyelid under minimal physical restraint. At the last follow-up 139 days later, lower eyelid entropion was not observed and related clinical signs disappeared. Therefore, HA subdermal filler can be an effective intervention for the treatment of entropion in cats.

Key words **:** cat, entropion, eyelid, filler, hyaluronic acid.

Introduction

Entropion, a medical condtion in which eyelid margins roll into the eyeballs, is common eyelid disease in dogs and cats causing irritation of the ocular surface and trichiasis by hair of periocular outer skin (12). Entropion can cause various clinical signs of epiphora, ocular discharge, blepharospasm, corneal ulcer, enophthalmos, corneal scar formation, corneal neovascularization, corneal pigmentation, and loss of the globe (1,12). It is usually subdivided into primary, secondary, and spastic or cicatricial entropion (1,12). Primary entropion is caused by congenital defects of the eyelid or globe during developmental period and common in purebred dogs such as Chow Chow, American Bulldog, Shar-Pei, Great Dane, St. Bernard, but not common in cats. It has been reported to occur mainly in Maine Coon and Persian cats (3, 12,15). Secondary entropion occurs due to the loss of orbital fat, enophthalmos secondary to muscle atrophy, and change of eyeball size caused by phthisis bulbi (3,7,12). Spastic entropion is caused by blepharospasm and eyeball retraction induced by ocular painful diseases, such as corneal ulcer, keratitis, distichiasis, primary entropion, and uveitis (3,12). It has been reported that cicatricial entropion may occur due to deformation of the eyelids by eyelid injury or inflammation, previous surgeries (1,12).

Depending on the species, age, etiology or severity, and position of entropion, various methods, such as temporary tacking suture, wedge resection, Hotz-Celsus technique, lateral arrow head procedure, medial canthoplasty, Stades forced granulation method, rhytidectomy, and brow sling procedures, are performed for the treatment of entropion (1,3,6,12).

In humans and animals, injecting petroleum, silicone, porcine liquid paraffin mixed with penicillin G without anesthesia had been tried to correct entropion, but it has been known to cause complications, such as abscess, severe swelling, fistula, and granuloma (3,4). Recently, hyaluronic acid (HA) subdermal filler with less side effects and low allergic reaction is being used in humans, and a study on HA filler application for entropion correction in dogs and cats was also reported (4,7).

This case report was aimed to present a case of entropion in an old cat and discuss the effect of HA subdermal filler as a non-surgical method for correction of entropion in cats.

Case Report

A 14-year-old, castrated male, Persian cat was presented to the Dana Animal Hospital Eye Center for clinical signs such as epiphora, blepharospasm, mild brownish ocular discharge, corneal neovascularization, and corneal opacity in the left eye (OS) (Fig 1A). Intraocular pressure measured by Tonovet® tonometer (Icare Finland Oy; Vantaa, Finland) measured 17 mmHg in the right eye (OD) and 15 mmHg OS, and tear production (Schirmer tear test®, Merck; NJ, USA) measured 12 mm/min OD and 17 mm/min OS. Fluorescein dye test (Fluorescein sodium®, Optitech Eyecare; Allahabad, India) was negative in both eyes. Slit-lamp biomicroscope examination (SL-D7®, Topcon; Tokyo, Japan) showed corneal neovascularization, corneal opacity, lower eyelid entropion in OS. The cat was diagnosed as secondary entropion of medial lower eyelid because the entropion did not disappear after topical 0.5% proparacaine eyedrop (Alcaine®; Alcon) instillation into the OS. For surgical correction of entropion, Hotz-Celsus method was considered. However, the owner

[1]Corresponding author.
E-mail : kmseo@snu.ac.kr

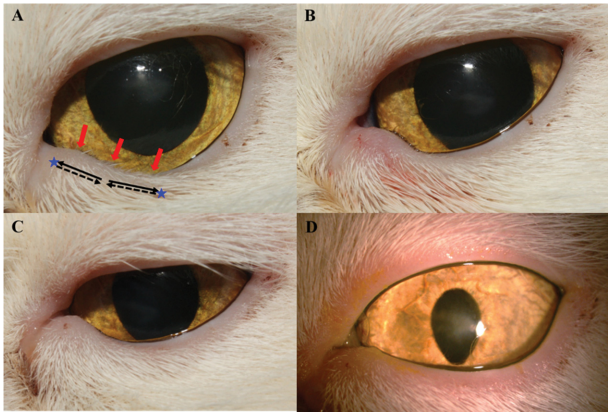

Fig 1. Follow-up photographs before and after the filler injection in the left eye. (A) Pre-injection. Medial entropion of the lower eyelid was observed (red arrow). A 27-gauge needle of hyaluronic acid filler was inserted through the skin (★) and advanced as shown by black dotted arrow, and then, hyaluronic acid was injected into the subdermal area while the needle was pulled back (black solid arrow). (B) Immediately after injection. Minimal skin hemorrhage from injection site was noticed. (C) 21 days after injection. (D) 139 days after injection. No recurrence of the medial lower eyelid entropion was observed.

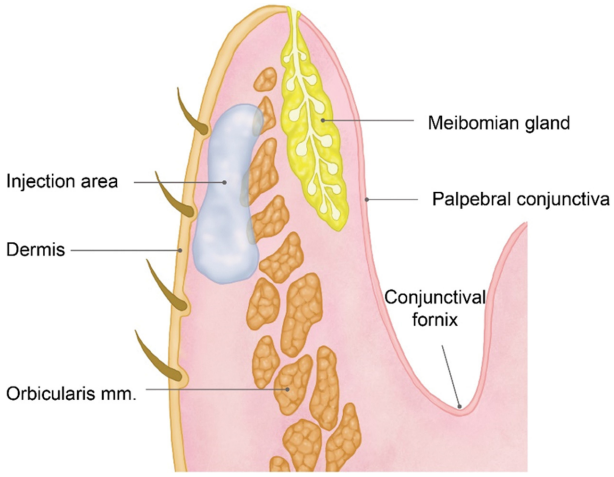

Fig 2. Schematic diagram explaining the injection site of hyaluronic acid filler.

did not want general anesthesia for surgical treatment since the cat was old and suffered from chronic kidney disease. Therefore, we decided to perform a 2.4% HA subdermal filler (Regenovue® Fine Plus; NeoGenesis) injection without general anesthesia. For preparation of injection site, medial area of the lower eyelid was disinfected with 0.5% povidone-iodine diluted with sterile 0.9% physiologic saline and applied with topical viscous 2% lidocaine (Lidocain jelly sungkwang; Firson). Under minimal physical restraint without sedation, each 0.1 mL of HA filler using 27-gauge needle was injected into the subdermal space (Fig 2) at medial and lateral end of entropion area 2 mm below the margin of lower eyelid (Fig 1A) (7). For preventing infection after injection, systemic cefadroxil (Cefadroxil®; Ilyang pharm) 20 mg/kg BID was administrated for 3 days. The owner was instructed to instill topical 0.15% sodium hyaluronate TID (Eyelein free®; Kolmar pharm) into the OS throughout the follow-up period. Elizabethan collar was not applied. The cat was rechecked 21 and 139 days after HA filler injection (Fig 1C, 1D). Epiphora and blepharospasm decreased 21 days after injection. At the last recheck 139 days after injection, mild corneal opacity remained, but corneal neovascularization and medial canthal entropion of the lower eyelid were not observed.

Discussion

Secondary entropion is known to occur more frequently than primary entropion in cats (3). Particularly, in brachycephalic cats, such as the Persian cat in this case report, it is known to be predisposed to the development of medial canthal entropion of the lower eyelid due to prominent eyeball and shallow orbital space (1,13).

Surgical treatment was recommended because chronic corneal irritation caused by lower eyelid entropion and trichiasis is a predisposing factor that can cause conjunctivitis, corneal ulcer, and corneal sequestrum in cats (3,14,15). White *et al.* reported that corneal sequestrum occurred in 39 out of 124 cats with lower eyelid entropion (14).

However, in contrast to dogs, which develop entropion at young age, feline entropion was known to occur frequently at old age (9). McDonald *et al*. also reported that the median age of cats with entropion was 9.7 years (mean 10 ± 5.5 years), relatively older than the dog's median age of 3.1 years (mean 5.1 ± 5.5 years) (7). Since older cats suffering from systemic diseases, such as heart failure, chronic kidney disease, and liver disease haver greater risk of general anesthesia for surgical treatment, HA filler injection, which could be performed with mild sedation or physical restraint without general anesthesia, was applied in veterinary ophthalmology (7).

Natural HA is known to be homogenous in chemical and molecular characteristics between species; hence there is no antigenicity and the possibility of hypersensitivity is low (11). It has the ability to bind with water and maintains the structure, elasticity, and volume of the animal skin, but it is decomposed by the hyaluronidase and quickly absorbed by the body (2,11). Non-animal HA made from bacterial biofermentation secured stable and long-lasting duration by performing as a stabilization process called cross-linking to compensate for this disadvantage (2,7,11). According to the processed particle type or cross-linking procedures, HA fillers can be classified into monophasic and biphasic HA fillers (2). Monophasic HA filler has smaller sized particles than biphasic HA filler and has greater cohesiveness and swelling capacity, which makes it advantageous for creating a desired shape. However, it is difficult to retain its shape due to its low elasticity. On the other hand, biphasic HA fillers have coarse particles and good resistance to hyaluronidase, and can keep the corrected shape firm, but it is difficult to create the desired shape (2,8).

McDonald *et al.* (7) used a biphasic HA filler (Restylane®; Galderma Laboratories) in their study. Restylane® was injected in dogs, and Restylane Silk® was injected in cats, which had

a smaller particle size than Restylane®. They reported that they used smaller particle size of biphasic HA filler with less drug reaction and inflammatory response instead of shorter duration due to their smaller mean particle size as cats are known to be more likely to develop sarcoma after injection of antibiotics, anti-inflammatory drugs, vaccines, and chemotherapeutics, or tumors caused by chronic inflammation (5,7).

Regenovue® Fine Plus used in this case report was a monophasic HA filler made by cross-link of 1,4-butanediol diglycidyl ether and HA. The particle size of Regenovue® Fine Plus is known to be smaller than Regenovue® Deep Plus, and its effect duration was reported to last 8-12 months (10). In this case report, no recurrence of entropion, inflammation of the injection site, and tumor until 139 days after injection were observed. In a study reported by McDonald *et al.* (7), 9 out of 12 cats showed a successful correcting effect, but 3 cats were reinjected. Due to the limitation of this case report that the follow-up could not confirm the period when the HA filler completely decomposed and absorbed, it is necessary to perform a comparative study on the entropion corrective effect and duration using monophasic and biphasic fillers in a larger population for a longer follow-up period.

Conclusions

In this case report, the cat with a secondary entropion of the medial lower eyelid had a high anesthetic risk due to old age and chronic kidney disease. Therefore, instead of a surgical treatment, entropion correction using a HA filler without anesthesia was performed, and no recurrence of entropion was observed 139 days after HA filler injection. This suggested that HA subdermal filler could be an easy and effective therapeutic option for the treatment of entropion without general anesthesia in cats.

Acknowledgments

We would like to thank to Hyejin Kim (medical illustrator) who helped us in drawing Fig 2.

Conflict of Interest

The authors declare no conflicts of interest and there was no financial support of manufacturer associated with the products used in this case report.

References

1. Bettenay S, Mueller RS, Maggs DJ. Diseases of the eyelids. In: Slatter's Fundamentals of Veterinary Ophthalmology, 6th ed. St. Louis: Elsevier Health Sciences. 2018: 127-157.
2. Flynn TC, Sarazin D, Bezzola A, Terrani C, Micheels P. Comparative histology of intradermal implantation of mono and biphasic hyaluronic acid fillers. Dermatol Surg 2011; 37: 637-643.
3. Gelatt KN, Whitley RD. Surgery of the eyelids. In: Veterinary Ophthalmic Surgery, 1st ed. Maryland Height: Elsevier Saunders. 2011: 89-140.
4. Haneke E. Skin rejuvenation without a scalpel. I. Fillers. J Cosmet Dermatol 2006; 5: 157-167.
5. Martano M, Morello E, Buracco P. Felne injection-site sarcoma: past, present and future perspectives. Vet J 2011; 188: 136-141.
6. McCallum P, Welser J. Coronal rhytidectomy in conjunction with deep plane waling sutures, modified Hotz-Celsus and lateral canthoplasty procedure in a dog with excessive brow droop. Vet Ophthalmol 2004; 7: 376-379.
7. McDonald JE, Knollinger AM. The use of hyaluronic acid subdermal filler for entropion in canines and felines: 40 cases. Vet Ophthalmol 2019; 22: 105-115.
8. Park KY, Kim HK, Kim BJ. Comparative study of hyaluronic acid fillers by in vitro and in vivo testing. J Eur Acad Dermatol Venereol 2014; 28: 565-568.
9. Read RA, Broun HC. Entropion correction in dogs and cats using a combination Hotz-Celsus and lateral eyelid wedge resection: results in 311 eyes. Vet Ophthalmol 2007; 10: 6-11.
10. REGENOVUE® Products Web site. REGENOVUE® Family of Products. Available at: https://www.neogenesis.co.kr/main. Accessed May 10, 2020.
11. Selyanin MA, Boykov PY, Khabarov VN. The biological role of hyaluronic acid. In: Hyaluronic acid: Preparation, Properties, Application in Biology and Medicine. 1st ed. Chichester: John Wiley & Sons, Ltd. 2015: 9-76.
12. Stades FC, Gelatt KN. Diseases and surgery of the canine eyelid. In: Veterinary Ophthalmology, 4th ed. Ames: Blackwell Publishing. 2007: 563-617.
13. Weiss CW. Feline entropion. Fel Pract 1980; 10: 38-40.
14. White JS, Grundon RA, Hardman C, O'Reilly A, Stanley RG. Surgical management and outcome of lower eyelid entropion in 124 cats. Vet Ophthalmol 2012; 15: 231-235.
15. Williams DL, Kim JY. Feline entropion: a case series of 50 affected animals (2003-2008). Vet Ophthalmol 2009; 12: 221-226.