Pakistan Veterinary Journal

ISSN: 0253-8318 (PRINT), 2074-7764 (ONLINE)
DOI: 10.29261/pakvetj/2021.001

CASE REPORT

Hyaluronic Acid Filler Injection as an Alternative to Surgery for the Correction of Canine Entropion

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ARTICLE HISTORY (19-275)

Received: June 30, 2019
Revised: October 25, 2020
Accepted: December 31, 2020
Published online: January 11, 2021

Key words:
Distichiasis
Entropion
Eyelid surgery
Filler injection
Hyaluronic acid filler

ABSTRACT

A 3-year-old intact female Old English Bulldog and 5-month-old spayed female Chow Chow were diagnosed with entropion. Instead of surgery, hyaluronic acid (HA) filler injections were performed to correct the entropion and relieve the associated symptoms. We used the layered feathering technique, which was effective for the administration of the HA into the tissues for the correction of canine entropion. The eyelid positions were maintained for 6-8 months after the procedures. These cases demonstrate that HA filler injections relieve clinical signs quickly and effectively, though temporarily, in patients with entropion.

To Cite This Article: Lee HE and Kim JY, 2021. Hyaluronic acid filler injection as an alternative to surgery for the correction of canine entropion. Pak Vet J, 41(1): 173-175. http://dx.doi.org/10.29261/pakvetj/2021.001

INTRODUCTION

Entropion is an inversion of the eyelid margin (Stades, 2013; Martin, 2017). In this position, the eyelid hairs contact the cornea directly, which may cause corneal irritation and corneal ulcer (Manning, 2014). Entropion can be divided into the following four types: breed-related/anatomical, spastic, atonic/senile, and cicatricial entropion (Manning, 2014). Anatomical entropion is the most common etiology in dogs (Manning, 2014). Anatomical entropion is an inherited form that is found (but not definitively established) in many breeds (McDonald and Knollinger, 2018). Spastic entropion is caused because of blepharospasm and retraction of the globe in response to ocular pain, which makes the eyelid turn inwards (Manning, 2014). This spastic entropion may resolve when the ocular pain is relieved (McDonald and Knollinger, 2018). Atonic entropion is an age-related lesion that occurs due to the weakening of skin elasticity and muscle tone of the eyelid (Manning, 2014). Cicatricial entropion occurs because of acquired lid distortion and scarring following a previous surgery, injury, trauma, or chronic inflammation; however, it is uncommon (Read and Broun, 2007).

A number of methods have been introduced for the treatment of entropion; however, a surgical method is the only definitive treatment. Several surgical techniques, such as the Hotz-Celsus procedure, lateral canthal closure, Y to V plasty on medial canthusplasty, rhytidectomy, Stades procedure, and a combination of these methods, have been described for the treatment of entropion. Furthermore, the choice of surgical technique depends on the patient's breed and age, degree of entropion, position on the eyelid, and cause of the entropion (McDonald and Knollinger, 2018). However, the temporary tacking method is often indicated rather than the permanent surgical method in many cases among veterinary patients. First, if a patient has spastic entropion because of pain, the tacking method can be used while the underlying cause has been treated. Second, in young patients, permanent eyelid correction should not be performed until the age of 5 to 12 months, as the face is not fully developed. Until then, the tacking method is used to prevent irritation in these patients.

Hyaluronic acid (HA) has become an important filler over the past 15 years in human medicine. McDonald and Knollinger (2018) in their study, applied HA as a subdermal filler to correct entropion in dogs and cats, and reported that it was a safe and easy method for the correction of mild to moderate entropion cases (McDonald and Knollinger, 2018). To the best of our knowledge, there are few scientific reports on the application of HA as a subdermal filler for the correction of eyelid deformities in veterinary ophthalmology (Wolfer, 2002; Goldberg and Fiaschetti, 2006; McDonald and Knollinger, 2018). Moreover, no studies have described the use of the layered feathering technique, which was effective for the administration of the HA into the tissues for the correction of canine entropion. Therefore, the purpose of this report is to introduce the application of HA

as a subdermal filler using the layered feathering technique for the correction of canine entropion.

Case history and clinical examination

Case 1: A 3-year-old, 19-kg, intact female Old English Bulldog had bilateral blepharospasm and epiphora of the right eye. The dog had undergone operation, 20 months previously, for surgical correction of prolapse of the nictitating membrane gland of the right eye and entropion of the lower left eyelid. Because the patient was easily excited and uncooperative, complete physical and ophthalmic examinations could not be performed. However, direct ophthalmoscopic examination of the right eye revealed mild swelling of the upper eyelid, along with upper and lower eyelid entropion. Distichiasis and mild chemosis were also identified (Fig. 1a), and corneal neovascularization and mild corneal edema were present on the peripheral dorsotemporal cornea. Examination of the left eye revealed entropion and distichiasis at the nasal region of the dorsal eyelid and at the temporal region of the ventral eyelid (Fig. 1b). Mild chemosis was observed but no corneal damage was detected.

Case 2: A 5-month-old, 14-kg, spayed female Chow Chow had bilateral blepharospasm, mild conjunctival hyperemia, and moderate ocular discharge intermittently for the last 3 months. Because the patient was uncooperative, it was difficult to examine the lesions; however, both eyes showed entropion at the temporal region of the lower eyelid and at the nasal region of the upper eyelid (Fig. 2). Mild conjunctival hyperemia was detected in both the eyes. Mild corneal edema and neovascularization were present in the left eye, and the right eye displayed moderate blepharospasm, although secondary and corneal damage was not detected (Fig. 2).

Treatment

Case 1: Both the eyes in this case were treated using the subdermal HA filler injections (Alyna, An-Vision, Germany) to correct the entropion under propofol (Provive 1%®, Myungmoon Pharm. Co., Ltd., Korea) sedation. After cleansing the periocular skin with 1% povidone-iodine solution, the conjunctival fornix was irrigated with 0.2% povidone-iodine solution. Subsequently, the conjunctive and cornea were carefully irrigated with 0.9% normal saline to remove any mucus, debris, and antiseptic solution. We then injected the HA filler around the periocular eyelid using a 27-gauge needle. Approximately 0.8-1 ml of HA was injected into the upper and lower eyelids, using the layered feathering technique as described by Goldberg and Fiaschetti (2006) (Fig. 3a). The injection was directed lateral to medial in the orbital rim deep into the orbicularis oculi muscle (Fig. 3b). After the procedure, 0.1% dexamethasone eye drops (Maxidex®, Alcon, Belgium) were prescribed. Cold compresses were also applied and massaging or rubbing of the eyelids was prevented. After the procedure, the blepharospasm disappeared immediately, and the dog was able to open the eyes well (Fig. 4). Five days later, the corneal edema and neovascularization had resolved. The eyelid position was maintained for 8 months, until entropion recurred in the temporal region of the right upper eyelid. We then corrected the entropion using the Hotz-Celsus method.

Fig. 1: Initial ophthalmic examination of Case 1. (a) Right eye. Entropion of the upper and lower eyelid is seen. (b) Left eye. Entropion of the upper eyelid and at the temporal region of the lower eyelid is evident.

Fig. 2: Initial ophthalmic examination of Case 2. Bilaterally, entropion at the temporal region of the lower eyelid and at the nasal region of the upper eyelid is evident. (a) Right eye. (b) Left eye. (c and d) The patient displays bilateral blepharospasm, mild conjunctival hyperemia, and moderate ocular discharge.

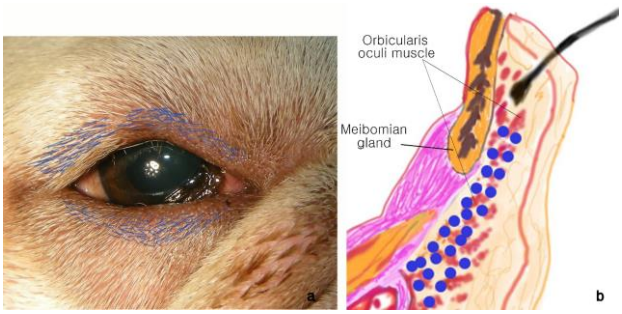

Fig. 3: Injection technique for correction of entropion using the hyaluronic acid (HA) filler. (a) The layered feathering technique used for the HA filler injection. (b) The HA is injected deep into the orbicularis oculi muscle.

Case 2: Both the eyes in this case were treated with the subdermal HA filler injections using the method described for Case 1, including the same post-procedure management. After the procedure, the patient immediately opened both the eyes well (Fig. 5a), and the blepharospasm disappeared 4 days later (Fig. 5b). Two weeks after the HA injection, the ophthalmic examination showed no signs of ocular discharge (Fig. 5c and 5d). Six months later, entropion recurred in the eyelids. We then performed the permanent Shar Pei-type entropion correction as described by Tuner (2008).

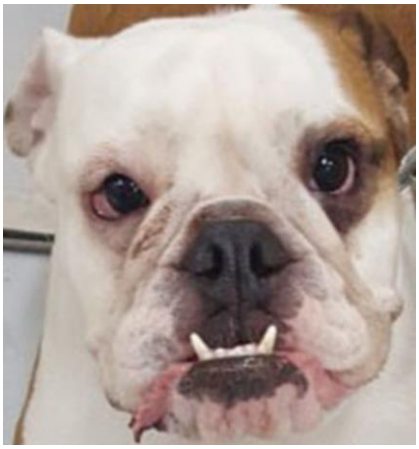

Fig. 4: Post-injection result of Case 1. The eyelids are positioned well, although the temporal region of the lower eyelids demonstrates slight ectropion. The blepharospasm and corneal lesions have disappeared completely.

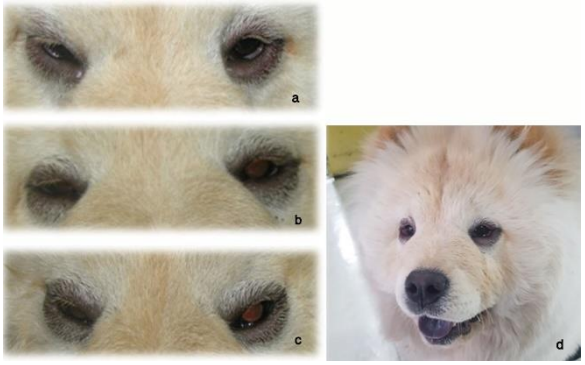

Fig. 5: Representative sequential photographs of Case 2. (a) Day 0 (post-injection). The patient opens both the eyes well immediately. (b) Four days post-injection, the blepharospasm has resolved. (c and d) Two weeks post-injection no signs of ocular discharge are seen.

DISCUSSION

HA was first introduced in 1934 by Meyer and Palmer (McDonald and Knollinger, 2018). They identified this high molecular weight polysaccharide acid from the vitreous humor of cattle (McDonald and Knollinger, 2018). HA belongs to a class of glycosaminoglycans (GAGs) (McDonald and Knollinger, 2018). These GAGs bind a significant amount of water, which aids in skin hydration and providing skin turgor (McDonald and Knollinger, 2018). HA also acts as a connective agent by forming the matrix fluid by which collagen and elastin fibers are intermixed (Larsen *et al.*, 1993). Unlike that of cattle collagen, the chemical structure of HA of other species is well preserved (McDonald and Knollinger, 2018). The potential for hypersensitivity reactions to HA is low, as there is no antigenic species specificity (Larsen *et al*., 1993). The half-life of HA in living tissues is only a few days, because hyaluronidases in the body naturally degrade and digest non-crosslinked HA. To prolong its longevity and durability, HA can be chemically altered by cross-linking the HA polymer chains to create a single molecule (McDonald and Knollinger, 2018). We used a 2.4% cross-linked HA filler, Alyna (Alyna, An-Vision, Germany). This newly released veterinary ophthalmology HA product can be used for animal eyelids. Alyna is similar to Restylane® (Galderma Laboratories, USA) and Restylane Silk® (Galderma Laboratories, USA), which are famous cross-linked products approved by the Food and Drug Administration (McDonald and Knollinger, 2018). They have been reported to last approximately for 6-12 months (Narins *et al*., 2008). In this study, the effects of HA injections lasted for 8 and 6 months in Case 1 and Case 2, respectively. Therefore, our results demonstrated that Alyna lasts for at least 6 months.

In this study, the HA filler was injected using a layered feathering technique, where multiple passes of the needle created a haystack configuration of multiple fine threads that were layered and feathered to create the desired three-dimensional contour (Fig. 3a) (Goldberg and Fiaschetti, 2006). The injection of HA was stopped once the entropion was corrected, and the position of the HA was adjusted by manual massage. This method worked well for administrating the HA injection.

The layered feathering injection technique using the HA subdermal filler is an effective, long-lasting, and easily performed technique that corrects mild to moderate entropion immediately in dogs. This technique is particularly beneficial for treating entropion using simple sedation for patients that have an increased anesthetic risk. The injection of HA subdermal filler is also a useful method for the treatment of entropion in young animals. Therefore, it may be a valid alternative to the tacking method. Further studies on the use of HA as a subdermal filler for animal eyelids are needed.

Authors contribution: HEL and JYK performed the treatment. HEL performed the survey and drafted the manuscript. JYK designed and performed the survey and drafted the manuscript. All authors have read and approved the final manuscript.

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