

The use of therapeutic soft contact bandage lenses in the dog and the cat: a series of 41 cases

Het gebruik van therapeutische zachte verbandcontactlenzen bij de hond en de kat: een reeks van 41 gevallen

S. M. Bossuyt

People's Dispensary for Sick Animals Pet Aid hospital, 14 Newhall Road, S9 2QL, Sheffield; People's Dispensary for Sick Animals Pet Branch, Northern Avenue, S2 2EJ, Sheffield, United Kingdom and Highfield Veterinary Centre, 145-147 London Road, Sheffield, S2 4LH, United Kingdom

stevbossuyt@aol.com

ABSTRACT

The objective of this case series was to illustrate in which cases soft contact bandage lenses can be used in the dog and the cat and how beneficial they are, supported by the literature. The benefit of the lenses was determined by how long the lenses stayed in place and if they contributed to the comfort of the patient. The average time the contact lenses stayed in place in both the dog and the cat was 9.8 days. Premature lens loss was seen in a limited number of cases (7% of the cases). Soft contact bandage lenses provided comfort and protection either in the initial healing phase, until the ulcer had healed (in cases of superficial corneal ulceration or cases of corneal ulceration with a limited stromal defect) or until surgery was performed (nasal trichiasis, entropion). In cases of corneal dystrophy, increased comfort for the patient was reported.

SAMENVATTING

De doelstelling van dit overzicht was om, ondersteund door de literatuur, te illustreren in welke gevallen een zachte verbandcontactlens gebruikt kan worden bij de hond en de kat en hoe nuttig ze zijn. Het voordeel van contactlenzen werd bepaald door na te gaan hoe lang de contactlens in het oog bleef en of ze het comfort van de patiënt verbeterden. De gemiddelde tijd dat de lens in het oog bleef, was 9,8 dagen (zowel bij de hond als de kat). Vroegtijdig verlies van de lens werd vastgesteld in een klein aantal gevallen (7%). De zachte verbandcontactlenzen verleenden comfort en bescherming ofwel in de aanvankelijke genezingsperiode, of tot het cornea ulcus (hoornvlieszweer) genezen was (in geval van een oppervlakkige zweer van het hoornvlies of een beperkt defect van het hoornvlies stroma) of tot op het moment dat chirurgie plaatsvond (voor trichiasis, entropion). In gevallen van corneale dystrofie werd een verbeterd comfort van de patiënt vastgesteld.

INTRODUCTION

Therapeutic soft contact bandage lenses have been used in general and referral small animal practice for some time. Already in 1977, Schmidt et al. found the use of hydrophilic contact lenses beneficial for superficial and recurrent corneal erosions in the dog and the cat. They have since been widely used in cases with indolent ulcers (superficial corneal erosions) to provide comfort and protection after a punctate or grid keratotomy for instance. An indolent ulcer or superficial corneal erosion is a superficial ulcer, which does not invade into the corneal stroma. These ulcers are typically associated with a loose non-adherent

epithelial border. They are chronic in nature and are caused by a defect in the epithelial basement membrane and the superficial stroma (covered by an abnormal hyalinized acellular zone) thereby preventing normal re-epithelization of the corneal defect (Wooff et al., 2015). Soft contact bandage lenses can form an adjunct therapy in cases of corneal ulceration, to reduce pain and to retain the tear film over the ulcerated area, hence encouraging healing (Turner, 2008). In cases of corneal dystrophy, they provide comfort and pain relief. Corneal dystrophies in the dog are disorders of the cornea that are inherited, bilateral, non-inflammatory and not accompanied by systemic disease. Most cases appear as grey-white, crystalline or



Figure 1. Corneal dystrophy in a Shetland sheepdog.



Figure 2. Bausch & Lomb (PureVision, Balafilcon A) therapeutic soft contact bandage lens.



Figure 3. A therapeutic soft contact bandage lens prior to application.

metallic opacities in the central or paracentral cornea (Figure 1). Some cases which are non-inherited are sometimes named under the same umbrella; a more appropriate term in these cases is corneal degeneration. In some cases of corneal dystrophy and corneal degeneration, recurrent erosions develop, which are painful. Therapeutic soft contact bandage lenses are useful in these cases. They have been found useful in traumatic corneal injuries, such as corneal lacerations and perforations by providing comfort and protection. For cases of corneal edema, they can reduce discomfort and prevent epithelial bullae from rupturing. In cases of adnexal eyelid problems, such as distichiasis, trichiasis, entropion and eyelid neoplasia, they can provide comfort, protection and pain relief and furthermore prevent corneal abrasions from forming until surgery can be performed (Renwick, 2007; Turner 2008). In more complex cases, they can reduce trigeminal pain following entropion surgery in cases of pre-existing corneal ulceration, preventing associated blepharospasm (hence spastic entropion), and hereby prevent the need for repeated surgery (Turner, 2008). They have also been used as part of the surgical correction treatment for symblepharon in cats (Bedford, 1983) and dogs (Hendrix, 2013). This case series further illustrates in which cases contact lenses can be used, and gives valuable information on how successful the contact lenses used in this case series are by measuring how long they remained in the eye of the patient.

MATERIALS AND METHODS

The clinical notes were reviewed of cases (41 eyes) in which a therapeutic soft contact bandage lens was used. All cases were seen and reviewed by a veterinary ophthalmologist (the author of this paper) either in a primary or secondary (referral setting) at three veterinary centers (People's Dispensary for Sick Animals Pet Aid Hospital, 14 Newhall Road, S9 2QL, Sheffield, People's Dispensary for Sick Animals Pet Branch, Northern Avenue, S2 2EJ, Sheffield, United Kingdom and Highfield Veterinary Centre, 145-147 London Road, Sheffield, S2 4LH, United Kingdom) between January and September 2015.

All cases underwent a full ophthalmic examination prior to placement of the lens. Cases with abnormal purulent discharge, cases with tear-film abnormalities and cases with suspected bacterial keratitis were excluded. Contact lenses are not recommended in cases of dry eye (Schmidt et al., 1977).

In all cases, the therapeutic soft contact bandage lenses used were Bausch & Lomb Pure Vision lenses (Balafilcon A, 14 mm diameter) (Bausch and Lomb, 2016) (Figures 2 and 3).

Proxymetacaine was instilled in the eye on each occasion prior to lens application in order to aid in successful placement of the lens (Figure 4). Chloramphenicol drops were used as topical antibiotic eye



Figure 4. Placement of a soft contact bandage lens in a Dalmatian.

drops. Systemic non-steroidal inflammatory drugs were used in most cases as adjunctive therapy carprofen (Norbrook, United Kingdom) or meloxicam (Norbrook, United Kingdom) in the dog; meloxicam in the cat. In cases with significant reflex uveitis (in the dog), topical atropine 1% once daily in the affected eye was added. In selected cases in the dog (nasal fold resection, cat scratch, stromal ulcer in a Boxer), systemic antibiotics cephalexin (Shering-Plough, United Kingdom) or amoxicillin/clavulanic acid (Norbrook, United Kingdom) were added to the treatment regimen. One cat was on systemic clindamycin (Zoetis, United Kingdom) because of concurrent dental disease.

The age range of the patients was very varied and ranged from one year old to ten years and ten months old in the dog and from one year and ten months old to eighteen years and five months old in the cat.

RESULTS

Dogs

A total of 41 contact lenses were placed, i.e. 34 cases in dogs and 7 cases in cats (Tables 1 and 2).

In 59% of the cases, a contact lens was placed as an adjunct therapy for the treatment of a superficial corneal ulcer (corneal erosion) (Table 1). The routine treatment of a superficial corneal ulcer consisted of debridement followed by a punctate keratotomy mostly under local anesthesia (Figure 5). In three cases, the lens was placed under general anesthesia as an adjunct therapy: one case in a crossbreed had a concurrent cherry eye and the other two cases were particularly boisterous dogs (one Boxer and one Staf-

fordshire bull terrier), which both had an initially debridement and punctate keratotomy, and for which a second procedure (debridement and punctate keratotomy) was required under general anesthesia, during which a new contact lens was placed. Contact lenses were placed at the end of the procedure to provide comfort and protection. In 29% of the cases, a contact lens was placed as adjunct therapy for a stromal ulcer (consisting of no more than a third to a half of the corneal stromal depth). In two of the cases, the stromal ulcer was caused by trichiasis and the contact lenses were placed prior to a nasal fold resection to provide comfort and protection. In one of these cases, a second contact lens was placed during surgery as adjunct therapy. In 6% of the cases, punctate superficial ulcers were treated with a contact lens as adjunct therapy. In 6% of the cases, they were used for corneal dystrophy to provide comfort.

In 94% of the overall caseload in the dog, the contact lenses were effective in providing comfort and protection either in the early healing stage or until the ulcer was completely healed, and in providing comfort in corneal dystrophy cases without causing any adverse effects. Comfort was determined by markedly reduced or absent blepharospasm, the fact excessive lacrimation had ceased and whether the eye was open on review. The owner would also comment when questioned that the eye had opened up and had become comfortable (gradually reducing or absent blepharospasm).

In 6% of the overall caseload in the dog, the contact lens proved ineffective (premature loss of the contact lens) as the dog managed to remove the lens after a few hours on each occasion, even when wearing an Elizabethan collar.

In 24 dogs, it was possible to establish the (exact, confirmed on review appointment) average time frame of how long the lenses stayed in place. This specific contact lens (Bausch & Lomb PureVision) stayed in place for an average of 9.7 days in the cases, of which accurate information was available.



Figure 5. A superficial corneal ulcer in a Boxer after debridement.

Cats

In 57% of the cats, a contact lens was placed in cases of a superficial corneal ulcer (Table 2). The contact lens was used as adjunct therapy to provide comfort and protection. In 14% of the cases, it was used to provide temporary comfort prior to entropion surgery. In 14% of the cases, it was used as adjunct therapy for a stromal ulcer (consisting of no more than a third to a half of the corneal stromal depth).

In 86% of the overall caseload in the cat, the contact lenses were effective in providing comfort and protection either in the early healing stages or until

the ulcer was completely healed, or in providing comfort (entropion) without causing any adverse effects. Comfort was determined by markedly reduced or absent blepharospasm, the fact excessive lacrimation had ceased and whether the eye was open on review. The owner would also comment when questioned if the eye had opened up and had become comfortable (gradually reducing or absent blepharospasm).

In 14% of the overall caseload in the cat, the contact lens proved ineffective (premature loss of the contact lens) as the cat managed to remove the lens after a few hours.

In two cats, it was possible to establish the (ex-

Table 1. Cases (34) in which a contact lens was placed in the dog.

Case number	Breed stayed in place	Problem information	Time lens	Result	Further
1	Lhaso apso	Superficial corneal ulcer	14 days (1)	Healed/confirmed	
2	Pug	(stromal) Corneal ulcer	?	Lost to Follow-up	
3	Boxer	Superficial corneal ulcer	3 weeks (1)	Healed/confirmed	
4	Shih tzu	(stromal) Corneal ulcer	2 weeks (1)	Healed/confirmed	Trichiasis case, had bilateral nasal fold resection
5	Crossbreed	(stromal) Corneal ulcer	4 days	Healing ++	Trichiasis case, had bilateral nasal fold resection
6	Crossbreed (*)	(stromal) Corneal ulcer	4 days	Healed/confirmed	Second lens placed (*) during nasal fold resection
7	Shih Tzu	(stromal) Corneal ulcer	?	Healed/confirmed	
8	Yorkshire terrier	Corneal dystrophy	> 5 days	Temporary comfort	Case of senile corneal dystrophy
9	SB terrier	Superficial corneal ulcer	7 days (1)	Healed/confirmed	
10	SB terrier	Superficial corneal ulcer	> 4 days	Healed/confirmed	
11	Boxer	(stromal) Corneal ulcer	7 days (1)	Healed/confirmed	
12	Crossbreed	(stromal) Corneal ulcer	?	Healed/confirmed	
13	Crossbreed	Superficial corneal ulcer	?	Healed/confirmed	
14	Boxer	Superficial corneal ulcer	?	Healing ++	Second lens placed (*)
15	Boxer (*)	Superficial corneal ulcer	?	Healed/confirmed	
16	Shih tzu	Punctate superficial ulcers	?	Healing ++	Second lens placed (*)
17	WHW terrier	Superficial corneal ulcer	18 days (1)	Healed/confirmed	
18	Boxer	Superficial corneal ulcer	?	Healed/confirmed	
19	SB terrier	Superficial corneal ulcer	?	Healing ++	Second lens placed (*)
20	Engl. Spr. spaniel	Superficial corneal ulcer	> 3 days	Lost to Follow-up	
21	Shih Tzu (*)	Punctate superficial ulcers	14 days (1)	Healed/confirmed	
22	SB Terrier (*)	Superficial corneal ulcer	?	Healed/confirmed	
23	Boxer	Superficial corneal ulcer	3 days	Healed/confirmed	
24	SB terrier	Superficial corneal ulcer	10 days (1)	Healed/confirmed	Distichiasis
25	Pug	(stromal) Corneal ulcer	half day	Ineffective (2)	This particular dog managed to remove the lens
26	Pug (*)	(stromal) Corneal ulcer	?	Ineffective (2)	even with a buster collar on, on 2 occasions (*)
27	Yorkshire terrier	Corneal dystrophy	22 days (1)	Healed/confirmed	corneal dystrophy with superficial corneal ulceration
28	Shih tzu	(stromal) Corneal ulcer	> 4 days	Healed/confirmed	Superficial cat-scratch
29	Crossbreed	Superficial corneal ulcer	27 days	Effective	Right eye, elderly dog, was euthanized for other health reasons
30	Crossbreed	Superficial corneal ulcer	27 days	Effective	Left eye, elderly dog, was euthanized for other health reasons
31	Greyhound	Superficial corneal ulcer	7 days (1)	Healed/confirmed	
32	Dalmatian	Superficial corneal ulcer	7 days (1)	Healed/confirmed	
33	Springer spaniel	Superficial corneal ulcer	7 days (1)	Healed/confirmed	
34	Sproker spaniel	Superficial corneal ulcer	6 days (1)	Healed/confirmed	

(1) Contact lens was removed and ulcer had healed

(2) Ineffective means the lens came out the same day and therefore was ineffective as adjunct therapy, the ulcer in case 25 and 26 was subsequently treated with a third eyelid flap and healed

Table 2. Cases (7) in which a contact lens was placed in the cat.

Case number	Breed stayed in place	Problem information	Time lens	Result	Further
1	Cat (DSH)	Entropion	?	Effective	Providing comfort
2	Cat (DSH)	Superficial corneal ulcer	11 days (1)	Effective	Provided comfort during healing process, FHV1
3	Cat (DSH)	(stromal) Corneal ulcer	?	Healed/confirmed	
4	Cat (DSH)	Superficial corneal ulcer	9 days (1)	Healed/confirmed	
5	Cat (DSH)	Superficial corneal ulcer	?	Healed/confirmed	
6	Cat (DSH)	Superficial corneal ulcer	?	Healed/confirmed	
7	Cat (DSH)	Superficial corneal ulcer	?	Ineffective (2)	Cat managed to remove lens, herpetic ulcer

DSH: Domestic shorthair

(1) Contact lens was removed and ulcer had re-epithelialized

(2) Ineffective means the lens came out the same day and therefore was ineffective as an adjunct therapy, the ulcer in this case eventually healed with time, without a contact lens

act, confirmed on review appointment) average time frame of how long the lenses stayed in place. This specific contact lens (Bausch & Lomb PureVision) stayed in place for an average of 10 days in the cases, of which accurate information was available, which is similar to the above figure in the dog.

In cats, it is generally more difficult to fit contact lenses as the eyelid aperture is smaller and tighter than in the dog. Furthermore, the third eyelid tends to protrude more easily when placing the lens. Hence, it becomes more difficult to place the lens (patience and the help of an assistant to hold the patient are recommended).

It should be noted that the specific lenses used in the cases of this review are very soft and provide a very good fit in most dogs and cats as they gradually settle in onto the corneal surface/curvature. The diameter is generally fine although in larger breeds, a touch larger diameter could be useful. In cats with a tight eyelid aperture and in kittens, they may prove too large and therefore are not useful in such cases. The author recommends reviewing each case on a weekly base initially. Although these specific contact lenses can comfortably stay in situ for three to four weeks in some cases, the author would advocate to remove them after that period of time or to change them for ongoing cases such as corneal dystrophy cases.

Proxymetacaine was instilled in the eye prior to lens removal in order to aid in the successful removal of the lens.

DISCUSSION

Reviewing the literature, the most common usage of soft contact bandage lenses is as adjunct therapy for the treatment of superficial corneal erosions. In this case series, they were used in 61% (25 overall) of the cases for the treatment of superficial corneal ulcers in the dog and the cat. In 11 cases (44% of the corneal erosion group), the lens was removed at a review appointment and it was confirmed the ulcer had healed. In these cases, the average healing time and

the time the lens had stayed in situ was 10.6 days. In the other 14 cases (56% of the corneal erosion group), the lens had either come out after 3-4 days (3 cases) or no accurate data of how long the lens had stayed in place was available (9 cases), but all cases healed with improved comfort reported by the owner. In two cases, the dog had indolent ulcers in both eyes and other complex disease issues, and was euthanized for concurrent severe systemic disease. In that particular case, the ulcers were slow healing but the lenses stayed in place for 27 days providing comfort to both eyes. At initial presentation, the dog had bilateral large corneal erosions with significant associated blepharospasm, which completely settled down after treatment and placement of a contact lens.

Looking at this case series, the lenses provided comfort and protection in either the initial phase of the healing process or until fully healed in cases of superficial corneal erosions in both the dog and the cat. Grinninger et al. (2015) found that the healing time with the use of soft contact bandage lenses as adjunct therapy is significantly shorter (mean 14 +/- 0 days) than in cases without the use of contact lenses (mean 36 +/- 17 days) in dogs. Wooff and Norman (2015) reported a statically significant decrease in median healing time in cases, in which a bandage lens was used after a linear grid keratotomy in cases of superficial corneal erosions in Boxers. Both this case series and the reported literature illustrate the benefits of the use of a soft contact bandage lens as an adjunct therapy in the treatment of superficial corneal erosions.

Although in most cases, the contact lenses were placed under local anesthesia, two dogs in this case series required general anesthesia to perform a second punctate keratotomy for the treatment of a superficial corneal erosion at which a second contact lens was placed as adjunct therapy. If the superficial corneal erosion is specifically large and/or the dog is not the easiest to keep still, sedation or general anesthesia is recommended in order to perform a complete punctate keratotomy. Furthermore, in dogs that are aggressive or very boisterous contact lenses are not recommended. Although the use of an Elizabethan collar

might be prudent in many cases (Turner, 2008), it is case-dependant (in the present case series, the usage of a collar was discussed with the client/owner on each occasion; many cases were fine without one).

Martinez (2010) reported that the best results with contact lenses are obtained in cases of corneal dystrophies and spontaneous recurrent erosion syndrome. In two cases (5% overall) of the present case series, the lenses were used in corneal dystrophy cases to provide comfort, with good result. In one of the cases, the contact lens stayed in place for 22 days.

Soft contact lenses can be useful in cases of adnexal disease (Renwick, 2007; Turner 2008). In four cases (10% overall) of the present case series, adnexal problems, such as trichiasis and entropion, were the reason for the use a contact lens either before surgery to provide protection or after surgery as continued treatment for a healing stromal ulcer.

The remainder of cases consisted of punctate superficial ulcers (two cases), a superficial cat-scratch (one case) and four cases of a stromal corneal ulcer (with a depth not exceeding more than a third to a half of stromal depth) demonstrating the diversity of cases, in which a soft contact bandage lens can be useful. All contact lenses stayed in place in these cases in the initial healing phase or until the defect was healed.

In some animals (7% of cases overall), the lenses came out prematurely. In this case series, one owner reported that his pet actively tried to remove the lens even with the wear of an Elizabethan collar. Premature loss of the lens has been reported in the literature (Morgan, 1984), but with the improvement in contact lens technology, newer lenses have a much better fit. The lenses used in this case series are specifically soft and settle into the eye nicely. These particular lenses start to take on the shape of the cornea after only a few minutes or less. Concerns regarding air bubbles under the lens, which are seen with some commercially available veterinary bandage lenses in the UK (Turner, 2008), are much less of a problem as they tend to dissolve after a few minutes.

CONCLUSION

Soft contact bandage lenses, in specific Bausch & Lomb Pure Vision (Balafilcon A), are useful as an adjunct therapy in several conditions reaching from superficial corneal ulcers, corneal dystrophies, adnexal disease to superficial stromal defects. The average time the lenses stayed in situ in this case series (in both dogs and cats) was 9.8 days with a low rate of premature lens loss (7%). They are particularly useful in superficial corneal ulcers, which is also confirmed in this case-series (Gosling et al., 2013; Grinninger et al., 2015; Wooff et al., 2015).

It is highly recommended to perform a thorough ophthalmic examination in each case. Soft contact bandage lenses are just one of the tools in the ophthalmic toolbox, they are not a quick fix and cases have to be assessed for suitability.

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