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Feline entropion: a case series of 50 affected animals (2003–2008)

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Abstract

Aim To evaluate the signalment, clinical signs, and etiopathogenesis of entropion in 50 cats.
Methods Signalment and history of 50 cases of entropion in cats presented to a referral ophthalmology clinic. Animals were examined with direct and indirect ophthalmoscopy and slit-lamp biomicroscopy. Animals were treated surgically with a Hotz-Celsus procedure and results of surgery were evaluated between 4 and 22 weeks.
Results Sixteen cats were young (mean age 4.1 ± 3.6 years) with pre-existing irritative ocular surface conditions such as conjunctivitis, corneal ulceration or sequestrum. Twenty-six cats were relatively older (mean age 11.3 ± 2.2 years) with involutional entropion with or without enophthalmos, presumed to result from a reduction in orbital tissue. Five cats were Persians with entropion associated with brachycephalic facial anatomy, whereas three were entire young adult male Maine Coones with in-turning associated with excessive facial 'jowl' tissue. Surgical treatment was curative in the majority of cases after one surgery although an increased amount of eyelid tissue was required to be removed for correction compared with similar surgery in the dog.
Discussion This study has shown that entropion in cats may be caused in young animals as a result of continued blepharospasm related to irritative causes such as conjunctivitis or corneal ulceration or in older animals with lid laxity or globe enophthalmos. Lid in-turning was also seen in Persian and Maine Coone breeds.

Key Words: cat, conjunctivitis, entropion, eyelid, irritation

INTRODUCTION

Entropion, lid in-turning, is common in dogs and widely documented in the veterinary literature with reports on the condition in different breeds of dog[1,2] with varying anatomical peculiarities[3,4] and with a number of different surgical techniques used to correct the lid defect.[5,6] Yet in the cat the condition is hardly reported and while it has been noted in general reviews of ocular disease in this species,[7,8] sizeable studies of case series have not been published. The fourth edition of Professor Gelatt's *Magnum Opus* Veterinary Ophthalmology devotes a mere 18 lines to the condition,[9] whereas Barnett and Crispin's Beautiful Atlas gives a page of information on the condition but considers it 'an uncommon problem in the cat.'[10] A survey of Medline shows 41 published articles on canine entropion but only 14 including information on feline entropion with only one of these, that of Weiss,[11] is a case series focusing solely on lid in-turning in the cat. This paucity of data does not, however, accurately reflect the prevalence of entropion in the cat. Here we report 50 cases of feline entropion, seen over the past 5 years in young cats, in older animals and in specific breeds, the Persian and the Maine Coone. Both of these breeds have eyelid in-turning associated with specific facial anatomical features while the entropion in young cats is generally linked with persistent ocular surface irritation such as conjunctivitis and keratitis. In the older animal the entropion appears associated with lid laxity as is seen in geriatric humans or enophthalmos with lid in-turning as a secondary feature. In these ways feline entropion differs quite substantially from the condition in dogs, where tarsal plate deformities seen in several breeds,[1] excess facial skin in breeds such as the Shar Pei[12] or drooping of facial tissue[3] are important causes of lid in-turning.

MATERIALS AND METHODS

Animals

The 50 animals reported herein were examined at either the Department of Veterinary Medicine, Queen's Veterinary

School Hospital, University of Cambridge (14 cases) or in a series of first opinion clinics for which the senior author provides an ambulatory ophthalmology referral service (36 cases).

Diagnostic and therapeutic techniques

After the taking of a full signalment and history, each animal underwent a full ophthalmic examination involving direct and indirect ophthalmoscopy (using a Welch Alynn direct ophthalmoscope and Keeler Vantage indirect ophthalmoscope, Keeler, Windsor, UK) and examination with slit-lamp biomicroscopy (initially using SL-15 slit lamp, Kowa, and latterly Hawkeye slit lamp, Dioptrix, France). Photographic documentation was achieved using a Coolpix 4500 digital camera and the Hawkeye slit lamp. Lid conformation was evaluated before and after application of local anesthetic (1% Minims Tetracaine, Chauvin Pharmaceuticals, Romford, UK) to the ocular surface.

Figure 1. (a) Unilateral entropion with enophthalmos in a 15-year-old domestic long haired cat (case 24). (b) Bilateral entropion with enophthalmos and blepharospasm in a 10-year-old domestic Short haired cat (case 28).

Diagnostic samples in cases of conjunctivitis were obtained as previously reported[13] and subjected to polymerase chain reaction for the diagnosis of feline herpesvirus, feline Chlamydophila and feline Mycoplasma.[14]

Surgery was performed under anesthesia with propofol induction and maintenance with gaseous anesthesia after endotracheal intubation using isoflurane in 100% oxygen. The Hotz-Celsus procedure was used to remove a tarsal strip of skin everting the lid as previously reported.[6]

RESULTS

The signalment and clinical signs of the animals examined are detailed in Table 1. Twenty-six animals were older cats with a mean age of 11.3 ± 2.2 years. Twenty-one of these animals had involutional entropion without an obvious cause for lid in-turning either unilaterally (Fig. 1a) or bilaterally (Fig. 1b). Five cats in this group had varying degrees of enophthalmos evident presumed to be caused by a reduction in orbital fat although in no cases would owners allow a magnetic imaging study to quantify this and B-mode ultrasonography was not sufficiently precise to allow accurate evaluation of the depth of the retrobulbar space. In 11 of these older cases trichiasis was evident with significant worsening of the lid in-turning through spastic entropion (Fig. 2a). Although there was some amelioration of entropion with local anesthetic, the trichiasis still remained as a problem giving persistent blepharospasm. Four cats had a previous history of conjunctivitis, although none in this group had ongoing inflammatory ocular surface disease at the time of presentation.

Sixteen cats were young with an average age of 4.1 ± 3.6 years and in these animals irritative foci such as persistent conjunctivitis, unilateral (Fig. 3a) or bilateral (Fig. 3b), corneal ulceration (Fig. 4) or sequestrum (Fig. 5). Three

Figure 2. Entropion with enophthalmos shown by the protruding third eyelid and with substantial resultant trichiasis in a 13-year-old domestic Short haired cat (case 20).

Table 1. Signalment and clinical signs of entropion in 50 cats

Case	Breed	Age (years)	Sex	Eye	Ophthalmic examination details
1	Dsh	0.8	fe	ou	Persistent conjunctivitis and blepharitis with self trauma and entropion of all four lids
2	Dsh	1.5	fn	ou	Conjunctivitis and ocular irritation with subsequent entropion of all four lids
3	Burmese	0.6	fe	os	Distichiasis with persistent irritation and subsequent entropion
4	Dsh	1.0	mn	ou	FHV-1-related conjunctivitis with irritation and subsequent entropion
5	Dsh	1.2	fn	os	FHV-1-related conjunctivitis with irritation and subsequent entropion
6	Dsh	1.8	mn	ou	Chlamydophila-related conjunctivitis with irritation and subsequent entropion
7	Dsh	3.6	fn	os	Persistent corneal ulceration with irritation and subsequent entropion
8	Dsh	5.3	mn	ou	Corneal sequestrum with irritation and subsequent entropion
9	Dsh	7.8	fn	ou	Corneal sequestrum with irritation and subsequent entropion
10	Dsh	4.5	mn	os	Corneal ulceration and early sequestrum formation with irritation and entropion
11	Dsh	2.1	fn	ou	Mycoplasma-related conjujnctivitis with irritation and subsequent entropion
12	Dsh	5.4	me	od	Post-trauma entropion
13	Dsh	6.4	mn	od	Idiopathic ocular irritation with sequestrum formation and entropion
14	Exotic Shorthair	5.4	fn	ou	Chlamydophila-related conjunctivitis with irritation and subsequent entropion
15	Burmese	7.5	mn	ou	Idiopathic conjunctivitis with irritation and subsequent entropion
16	Burmese	3.4	mn	ou	FHV-1-related conjunctivitis with irritation and subsequent entropion
17	Dsh	12.2	fn	ou	Mild enophthalmos with loss of retrobulbar tissue and lower lid entropion
18	Dsh	10.2	fn	ou	Moderate enophthalmos with subsequent lower lid entropion
19	Dsh	10.2	fn	ou	Mild enophthalmos with loss of retrobulbar tissue and lower lid entropion
20	Dsh	13.0	fn	ou	Mild enophthalmos with trichiasis and subsequent lower lid entropion
21	Dsh	15.0	mn	ou	Substantial enophthalmos with trichiasis and lower lid entropion
22	Dsh	12.4	mn	ou	Lid laxity with normal globe position but significant lower lid entropion
23	Dsh	14.3	mn	ou	Lid laxity with mild lower lid entropion
24	Dsh	15.2	mn	ou	Lid laxity with moderate lid entropion and resultant trichiasis
25	Dsh	8.4	mn	ou	Lid laxity with substantial lid entropion and resultant trichiasis
26	Dsh	9.5	fn	ou	Lid laxity with mild lower lid entropion
27	Dsh	8.3	fn	ou	Lid laxity with mild lower lid entropion
28	Dsh	10.2	fn	ou	Lid laxity with moderate lid entropion and resultant trichiasis
29	Dsh	11.5	fn	ou	Lid laxity with moderate lid entropion and resultant trichiasis
30	Dsh	13.2	fn	ou	Lid laxity with trichiasis and significant lower lid entropion
31	Dsh	12.2	fn	ou	Lid laxity with moderate lower lid entropion and early trichiasis
32	Dsh	8.7	mn	ou	Mild lower lid entropion
33	Dsh	9.6	mn	ou	Mild lower lid entropion
34	Dsh	10.5	mn	ou	Moderate lower lid entropion with some early trichiasis
35	Dsh	7.5	fe	ou	Moderate idiopathic lower lid entropion with normal globe position
36	Dsh	12.2	fn	ou	Lid laxity with trichiasis and significant lower lid entropion
37	Dsh	13.1	mn	ou	Lid laxity with trichiasis and significant lower lid entropion
38	Dsh	12.0	fn	ou	Mild lower lid entropion
39	British Blue	7.5	me	ou	History of previous conjunctivitis but current entropion of all lids
40	Exotic Shorthair	8.6	fn	ou	History of previous conjunctivitis but current entropion of all lids
41	Colourpoint	9.2	fe	ou	History of previous conjunctivitis but current entropion of all lids
42	Siamese	8.4	fn	ou	History of previous conjunctivitis but current entropion of all lids
43	Persian	4.6	mn	ou	Brachycephalic face with lower lid trichiasis and subsequent entropion
44	Persian	6.7	fn	ou	Brachycephalic face with lower lid trichiasis and subsequent entropion
45	Persian	5.2	fn	ou	Brachycephalic face with trichiasis and subsequent entropion
46	Persian	3.9	mn	ou	Brachycephalic face with trichiasis and subsequent entropion
47	Persian	8.5	fn	ou	Brachycephalic face with trichiasis and subsequent entropion
48	Maine Coone	0.8	me	ou	Lower lid entropion with pronounced jowls
49	Maine Coone	1	me	ou	Lower lid entropion with pronounced jowls more pronounced in right eye
50	Maine Coone	1.5	me	ou	Lower lid entropion with pronounced jowls

animals were diagnosed with FHV-1-related conjunctivitis by PCR and two were diagnosed as infected with feline chlamydophila. Treatment with topical acyclovir was instituted for the former cases while the latter were treated with topical chlortetracycline and doxycycline *per os*. In one case distichiasis was present (Fig. 6). Initial observations appeared to show only an entropion associated with idiopathic irritation (Fig. 6a) while eversion of the lid demonstrated the presence of a small number of distichial lashes (Fig. 6b). Five cases were Persian cats in which the brachycephalic facial characteristics led to lid in-turning with trichiasis and abrasion of lid hairs on the ocular surface, further worsening blepharospastic lid in-turning. Three cats were male entire Maine Coones in which the large 'jowls' of these adult males caused lid in-turning and trichiasis (Fig. 7a–c).

Treatment of these animals was by a standard Hotz-Celsus technique, which resolved the lid in-turning after a single operation in the vast majority of cases (Fig. 2b). Two younger

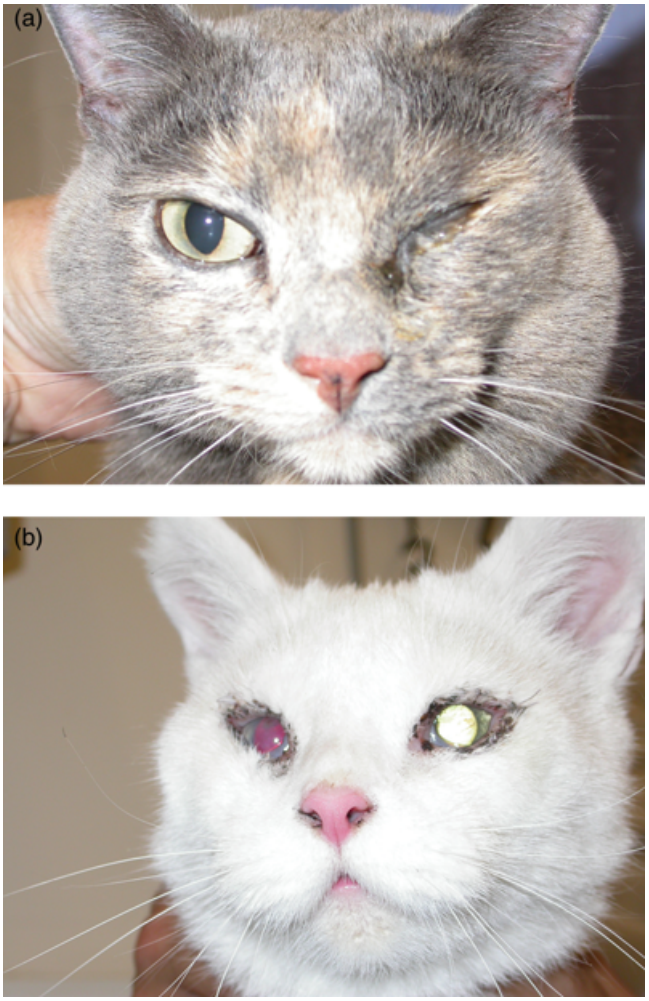

Figure 3. (a) Domestic Short haired cat with entropion unilaterally with concurrent severe conjunctivitis (case 5). (b) Domestic Short haired cat with entropion bilaterally with concurrent chronic conjunctivitis (case 1).

Figure 4. Lower lid entropion in a cat with a concurrent corneal ulcer also demonstrating early sequestrum formation after development of the entropion (case 10).

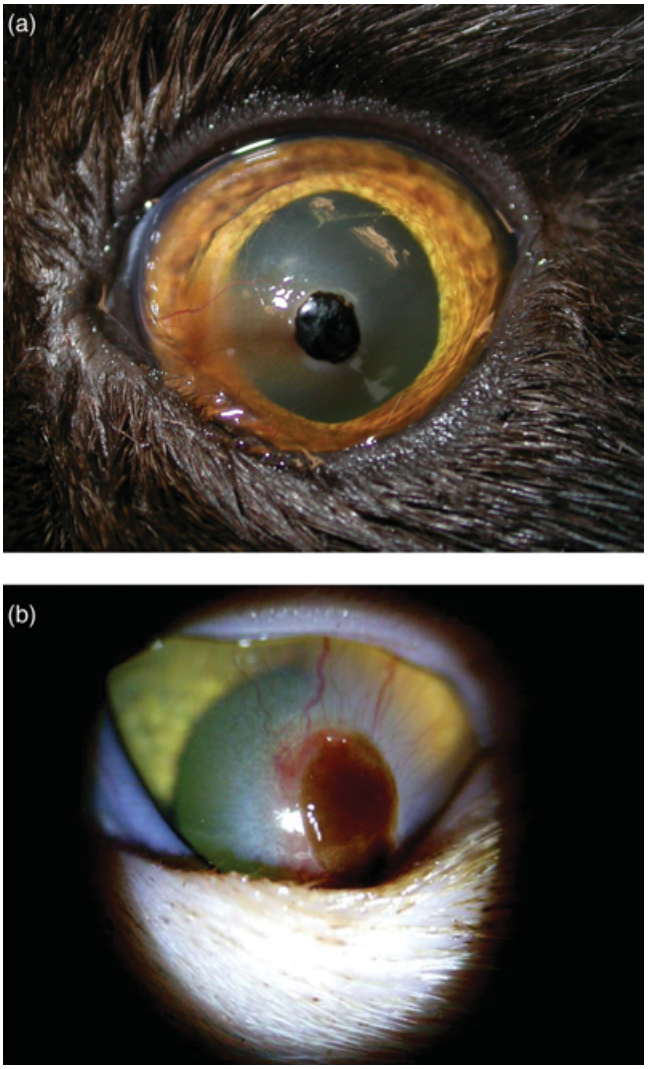

Figure 5. (a) Lower lid medial entropion occurring subsequent to blepharospasm associated with a corneal sequestrum (case 9). (b) Mild lower lid entropion occurring subsequent to blepharospasm associated with a corneal sequestrum (case 13).

cats (cases 4 and 7) and three older cats (cases 30, 36 and 37) required a further operation while two Maine Coone cats (cases 48 and 49) required further surgery. A greater amount of lid skin was needed to be removed for adequate correction in the majority of cats than would be the case in a similar condition in the dog. It appeared that long-term resolution of the eyelid in-turning was best achieved with surgery, which in the immediately post-operative period resulted in a mild ectropion. Within one week this out-turning had resolved to leave a perfectly apposed lid margin and ocular surface. A surgery resulting in perfect apposition in the immediate post-operative period, as occurred with the five cases noted above, led to long-term failure with recurrent mild entropion and the need to perform a second resection of eyelid skin.

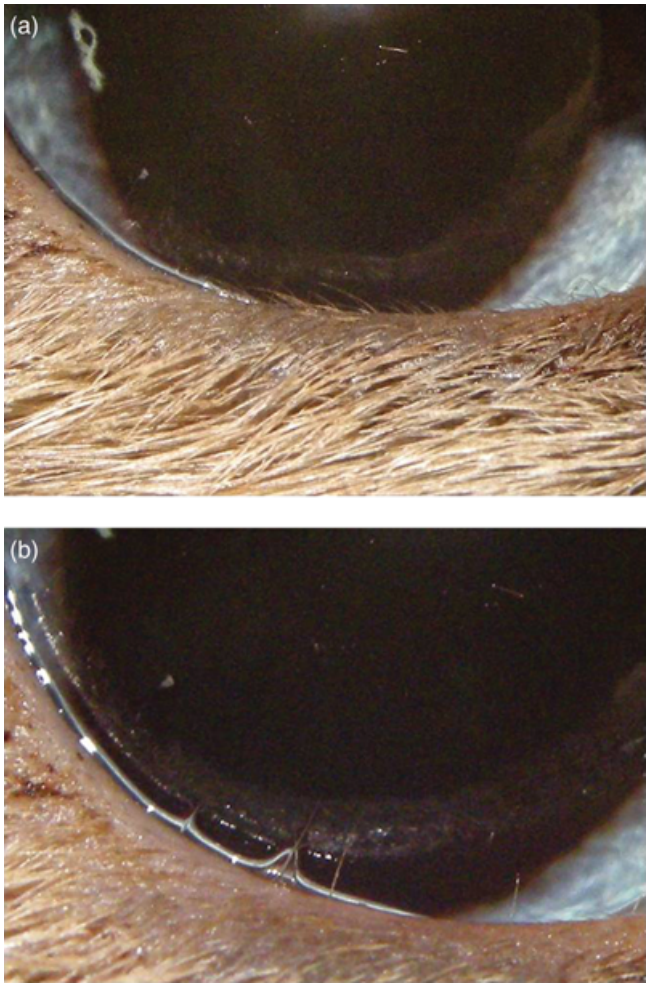

Figure 6. (a) Entropion with trichiasis in a 6-month-old Burmese cat (case 3). (b) Eversion of the lid in the cat in Fig. 6a reveals the distichia initially causing the blepharospasm leading to entropion.

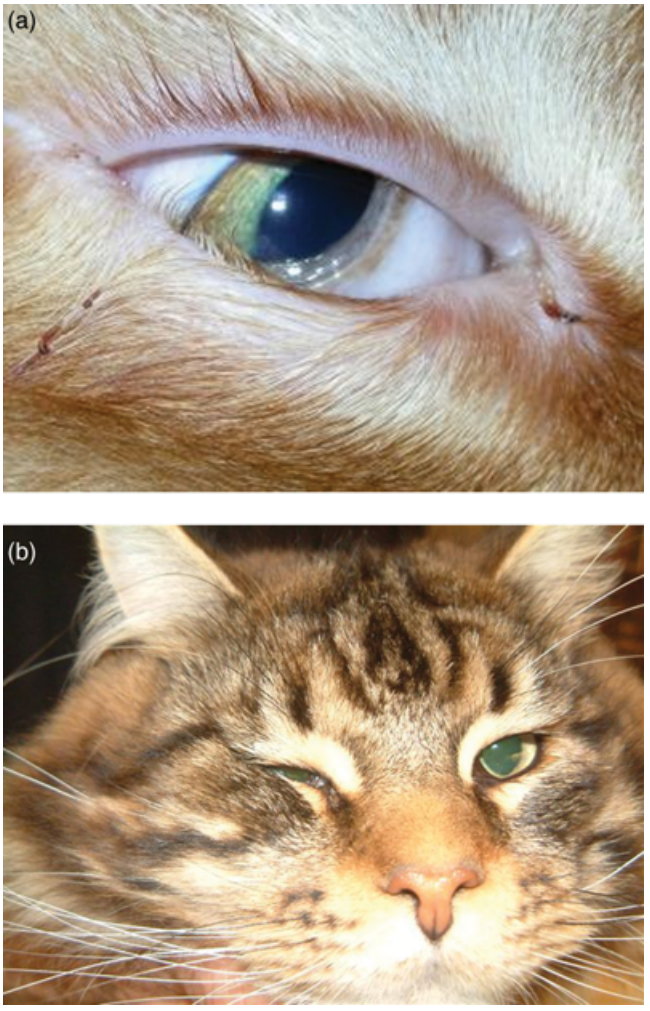

Figure 7. (a) One-year-old entire Maine Coone cat showing entropion associated with pronounced facial 'jowls' (case 49). (b) Entropion, predominantly of the right eye although occurring in both, in the son of the cat in Fig. 7a (case 50) again showing the pronounced 'jowls' resulting in the lid in-turning.

DISCUSSION

It should not be surprising that cats as well as dogs can suffer from entropion. Indeed, what is surprising is that the condition has not been more widely recognized and reported in the veterinary ophthalmic literature. It might be considered that the prevalence of the disease is lower in the cat than in the dog, although determining a prevalence is impossible without knowing the denominator data regarding the number of animals in the population from which these animals were taken. Over the same time period the authors examined 356 dogs with entropion, allowing the tentative suggestion that dogs may be affected around seven times as frequently as cats. A recent study documenting a surgical approach to entropion in dogs and cats[15] evaluated the technique in 269 dogs and 42 cats, a proportion of 6.4 to 1, not dissimilar to our relative prevalence of 7.12 to 1. More importantly, canine and feline cases of entropion differ in their presentation and etiopathogenesis.

A case series such as the current one shows the different forms of entropion seen in this species. Barnett and Crispin[10] consider feline entropion to occur with anatomical, spastic or cicatricial etiopathology although their comments in a text and atlas are understandably not supported by numerical evidence. In the present series of cases we did not encounter cicatricial entropion but found that there are two main etiopathogenic origins of the condition. The first is seen in younger animals where ocular surface irritation from conjunctivitis, corneal ulceration or corneal sequestrum causes lid in-turning. In one case distichiasis was noted (Fig. 6). It might be asked whether corneal ulceration or the effect of the lid in-turning was the cause, although it was considered in the animals here given the history taken from the owners that it was local irritation that first caused the blepahrospasm and next the lid in-turning. It might well be suggested that

one lesion accentuates the other in a vicious circle. In the present authors' opinion this has to remain a conjecture. The second form of the condition occurs in older animals and here it seems that lid laxity or tension with or without enophthalmos, presumed to be from a loss of retrobulbar tissue in older cats, is the primary problem that results in entropion with subsequent trichiasis (Fig. 2). Entropion in the dog is related to anatomical abnormalities of the lid tarsal plate, lid length or lateral ligament laxity, or to facial skin abnormalities in breeds such as the Shar Pei when young or Cocker Spaniels when older. Entropion in the cat appears quite different from that in the dog with in-turning associated predominantly either with persistent ocular surface irritation and blepharospasm in young animals and increased lid tension or enophthalmos in older individuals.

The finding of entropion in brachycephalic breeds such as the Persian has been anecdotally noted previously,[8] although this was in a review article and without the details of specific cases noting signalment and ocular signs. Barnett and Crispin consider anatomical entropion 'is most commonly seen in the Persian cat...in which it may be present from an early age and usually involves the lower eyelid and particularly the medial aspect of the eyelid initially.' We have not seen this in our present study, which serves to show the limitations of a case series from one clinician, even when it contains 50 animals.

The finding of entropion in Maine Coone cats (Fig. 7a,b), associated with the prominent jowl or cheek tissue seen in young entire adult male cats is, to our knowledge, a new finding. Related females did not have the marked facial features of the males and hence were not affected by entropion. In all these cases where entropion is severe, the point at which trichiasis occurs seems a critical one whereby irritation leads to increased blepharospasm and lid in-turning and further irritation. This is seen in the dog also, but appears particularly problematic in the cats in this series.

It is widely known that entropion can be corrected in many cases with resection of a skin strip, the so-called Hotz-Celsus procedure.[5,6] In the cats presented here the amount of skin requiring removal to effect a permanent repair was somewhat greater than in similar surgery in the dog. While in the dog a good apposition of eyelid margin with ocular surface at the close of surgery is sufficient to give a good long-term result, it would appear that in the cat a mild ectropion at the end of surgery results in a good long-term correction while a perfect apposition of lid margin with the ocular surface as the animal recovers from anesthetic can lead to a recurring entropion in the weeks after surgery. Primary surgery was not adequately corrective in two of the three Maine Coone cats where a greater amount of skin needed to be removed than would be required in the majority of cats in this study.

CONCLUSION

It might seem surprising that a relatively common condition such as entropion in the cat has, to date, been so poorly documented. Indeed, it may be the fact that this is not an unusual abnormality that has led to this lack of reporting. Having evaluated these 50 cases, however, we see entropion in the cat as quite a different condition from that in the dog, one with different causes and a modification of the surgical treatment required for long-term correction. It is hoped that this article will encourage veterinarians to recognize and treat feline entropion more successfully than previously.

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