

Diagnosis and treatment of entropion in felines

Author : Jesus Diaz and Rachael Grundon

Categories : [Companion animal](#), [Vets](#)

Date : July 13, 2015

ABSTRACT

Entropion is an eversion of an eyelid margin, resulting in trichiasis (hair rubbing against the cornea). Cats as well as dogs can suffer from entropion. However, this condition is not well recognised or reported in the veterinary ophthalmology literature. Cat entropion can be primary or secondary (spastic or cicatricial).

The aetiologies of cat entropion can be multiple, including persistent conjunctivitis or corneal ulceration. Two categories have been proposed based on age (young or old animals). A further category was proposed in relation with an elongated facial anatomy. Diagnosing entropion may be challenging and for this reason it is very important to perform a complete ophthalmic examination.

The treatment for cat entropion is normally surgical and various methods have been described. This review summarises the surgical procedures including preparation of the eye and the outcome of surgery, comparing different techniques. According to the literature, combined modified Hotz-Celsus (HC) and lateral canthal closure (LCC) is the most successful technique to correct lower eyelid entropion in cats. A prophylactic lateral canthal closure in the contralateral unaffected eye may decrease the risk of entropion developing. Cats with entropion usually have a concurrent disease, such as ulceration or corneal sequestra, which may need to be addressed concomitantly with lid correction.

The eyelids and ocular adnexa protect the globe, produce one of the three components of the precorneal tear film (the lipid layer), spread the tear film over the corneal and conjunctival surfaces, remove debris from the corneal surface and promote normal tear drainage¹.

Physical or functional abnormalities of the eyelids may result in ocular pain, corneal pathology and

decreased vision.

Entropion refers to inversion of an eyelid margin, resulting in trichiasis (hair rubbing against the cornea). It is a condition recognised much more commonly in dogs than cats.

Historically, entropion has been classified into two categories:

- primary or conformational entropion occurring from developmental abnormalities of the tarsus, orbit, globe and their interrelationship
- secondary entropion; either spastic or cicatricial

Spastic entropion refers to entropion caused by spasm of the orbicularis oculi muscle in response to severe ocular pain or irritation. The lids can be turned out to a normal position, but will turn back in due to the continued blepharospasm.

Cicatricial entropion arises from acquired eyelid deformities from previous surgeries, injury, trauma or chronic inflammation (for example, cats with chronic herpes keratitis). This will resist attempts to physically turn the eyelid back out to a normal position.

Entropion in dogs is most often associated with primary abnormalities of the eyelid length, laxity of the lateral canthal ligament or abnormal facial skin. Entropion in cats however, presents with a different aetiology. Williams and Kim² proposed two categories based on age – young animals and older animals. In the latter category, ageing enophthalmos was presumed to be a major underlying issue. A third category has also been proposed by White et al³ consisting of those cats with an elongated facial anatomy creating an anatomic enophthalmos.

Diagnosis

Table 1. Systematic steps to diagnose eyelid entropion in cats

Assess eyelid conformation
Schirmer tear test (STT)1
Apply topical anaesthesia
Reassess eyelid conformation
Fluorescein stain test
Globe examination

To enable a diagnosis to be made, a full clinical history should be taken, along with a complete ophthalmic examination, and any potential underlying systemic disease should be ruled out (**Table 1**).

The facial conformation and eyelid position should be carefully assessed, both before and after application of topical anaesthesia. A Schirmer tear test (STT) 1 should be performed before significant lid manipulation and before placing any drops on the ocular surface⁴.

The normal tear test value in cats is considered to be 12mm/min to 21mm/min, with keratoconjunctivitis sicca being a STT value of less than 5mm/min with consistent clinical signs⁵.

Unfortunately, the STT is not reliable in cats because many normal cats have low tear readings, so results must be interpreted in the light of the clinical presentation.

Fluorescein stain testing of the cornea is important to check for the presence of ulceration or corneal trauma. Ulcers can be both the cause and result of entropion. Corneal ulceration causing pain will exacerbate any spastic component to the entropion, although this component may be eliminated by topical anaesthesia.



Figure 1. Assessment of the eyelid position can be challenging in mild cases of entropion.

Examination of the cornea and lids for any coexisting disease, such as distichia or coloboma (a congenital defect where tissue is missing), is very important. Magnification will aid this process. If there is corneal damage the eye should be further assessed for reflex uveitis.

Blepharospasm may be a clinical sign of entropion due to corneal discomfort, but many cats appear stoical and may not be presented for examination until relatively late in the disease's course. Epiphora and wetting of the hair at the eyelid edges may be a more reliable marker of suspected entropion. Assessment of the eyelid position can be challenging in mild cases of entropion (**Figure 1**).

Regardless of the cause, entropion is always associated with some degree of trichiasis, resulting in ocular pain. For this reason, spastic entropion is a component of all cases of entropion. It is essential to eliminate this spastic component before permanent surgical correction, otherwise postoperative ectropion due to overcorrection may occur. Because of this, eyelid conformation should be evaluated before and after application of topical anaesthesia (for example, proxymetacaine).

Treatment of entropion

Table 2. Techniques for cat entropion correction
Modified Hotz-Celsus (HC)
V-wedge excision
Combination HC with permanent lateral canthal closure
Combination HC with wedge resection

Various methods of entropion correction have been described in the surgical management of feline entropion (**Table 2**).

If the spastic component is believed to be large, secondary to another disease process, temporary solutions such as tacking sutures, contact lenses or tarsorrhaphies may be employed until the underlying disease is controlled, then the extent of the entropion may be reassessed.

The majority of entropion cases will require definitive corrective surgery.

- Patient preparation
- Eyelids should be prepared for surgery following normal aseptic procedures⁵.

The eyelid skin is extremely sensitive and will traumatise easily if the clipping is not carefully performed. The hair should be clipped as gently as possible, pulling the lid skin tight to minimise snagging with the clippers. The eyelashes can be trimmed using small scissors with the blades coated with a thin layer of petrolatum or obstetric lubricant gel. The clipped lashes will stick to the blades and not fall on the corneal surface.

The conjunctival sac should then be flushed with saline to remove hair and gross debris. The ocular surfaces, conjunctival sac and beneath the third eyelid can then be flushed with 1:50 povidone iodine solution (PVP-I), using a luer lock syringe and a loop cannula or soft catheter.

Cellulose swabs or cotton buds impregnated with 1:50 PVP-I are used to swab fornices and lid margins. Gauze swabs impregnated with 1:10 (1%) PVP-I are used to clean lids and periorbital areas, working in the direction of hair growth to avoid dissemination of loose hairs.

Finally, saline should be used to flush the corneal surface to remove any residual PVP-I.

Note, the povidone iodine used must be the solution formulation and not the scrub or the tincture. Both scrub and tincture contain substances toxic to the cornea and must not be used on or around the eye.

Techniques

Different techniques are described for cat entropion correction (**Table 2**).

If bilateral surgery is planned, a careful preoperative note should be made of whether the extent of resection required is symmetric.

Undercorrection, with the need for a second operation, is preferable to postoperative iatrogenic ectropion due to overcorrection.

As always, surgical trauma should be minimised. The eyelids are well supplied with both nerves and blood vessels and will swell and be painful without gentle surgical handling. Brisk surgery is to be preferred because eyelids will start to swell from the moment surgery begins and prolonged

surgeries make accurate apposition of tissues more challenging⁶.

Use of an Elizabethan collar postoperatively is recommended to avoid the chance of self-trauma. Good surgical technique will minimise the patient's drive to rub, as the lid position will be better and more comfortable than before surgery.

Adequate postoperative analgesia should be provided for the first three to four days. Regional anaesthesia by infiltration of local anaesthetics at the end of surgery (bupivacaine or mepivacaine) may decrease the chance of self-trauma in the immediate postoperative period or if dysphoric during anaesthesia recovery. Systemic NSAIDs should be used perioperatively and postoperatively to reduce swelling and discomfort.

Systemic antibiotics may be necessary if skin excoriation or maceration is present. Topical antibiotics are recommended in cases of corneal ulceration, wedge resection or lateral canthal closure (LCC).

Following surgery, some minor swelling is to be expected. If greater swelling than usual is encountered, it may be reduced with cold compresses. Critical postoperative assessment of eyelid position should be delayed until this initial swelling has resolved.

Modified Hotz-Celsus

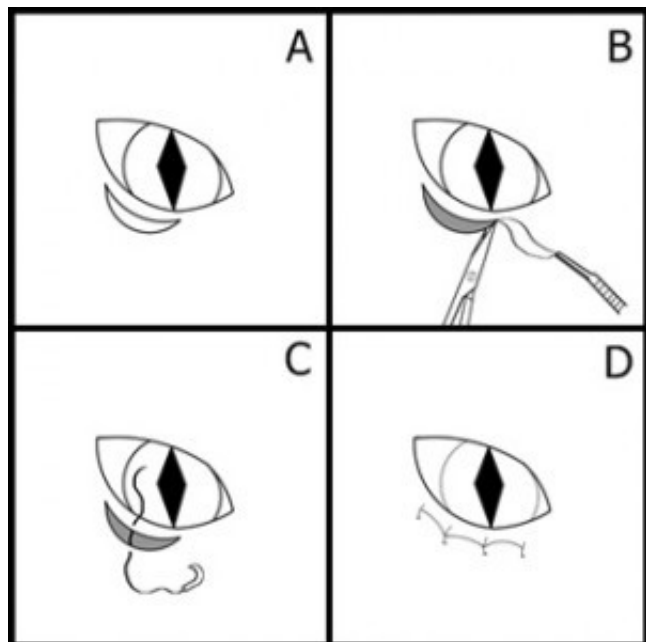


Figure 2. The modified Hotz-Celsus technique. The wound is closed with simple interrupted sutures.

In the modified Hotz-Celsus technique (HC) an initial incision is made with a scalpel blade 2mm from, but parallel to, the lid margin, extending along the area of entropion plus 2mm to 3mm either side. The incision needs to be close to the lid margin to make the correction more accurate, and also to reduce the amount of tissue to be removed.

A second curvilinear incision is made ventral to the first – the distance between them will depend on the extent of the entropion. The intervening skin is resected, creating a crescent-shaped defect.

The wound is closed by simple interrupted sutures 5/0 or 4/0 polyglycolic acid or poliglecaprone 25. Non-dissolvable sutures may be used, but patient compliance may be an issue for removal. Sutures should be perpendicular to the eyelid margins and placed using the “rule of bisection”. Place the first suture in the middle of the wound to ensure the widest point of resection is not displaced laterally or medially. Placement of each subsequent suture should bisect the distance still to be sutured (**Figure 2**).

V-wedge excision

V-wedge excision is used for entropion, mostly in combination with an HC7, but also for ectropion, smaller eyelid colobomas and small tumours.

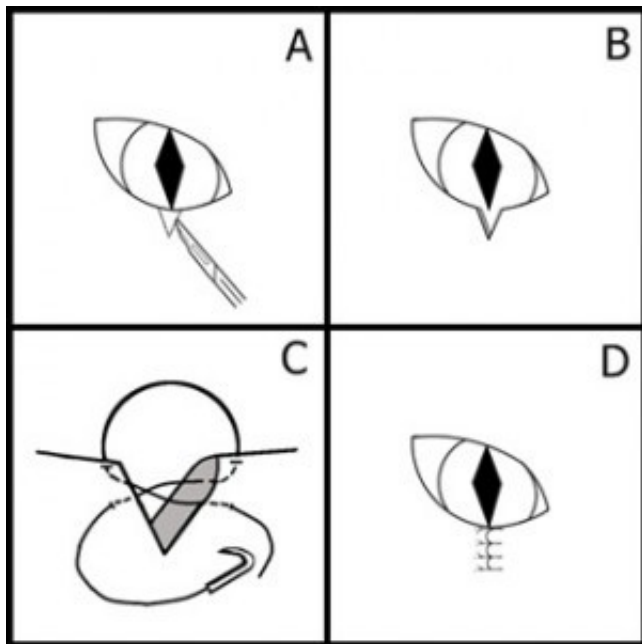


Figure 3. A V-wedge excision can be used for entropion, mostly in combination with a Hotz-Celsus. The lid margin should be reapposed with a figure of eight suture.

No more than 25% of the eyelid length should be removed in cats, and for entropion surgery much less is usually required as the aim is merely to “tighten” the lid.

For an easier surgery, place the excision centrally in the lower eyelid or centrally in the HC site. The skin incision, including the lid margin, should be made with a scalpel for a sharp margin to reappose and reduce tissue trauma. The subcutis and conjunctiva are cut with scissors.

The lid margin should be reapposed with a figure of eight suture to avoid suture rubbing. A two-layer closure is rarely required in cats unless the wound is under significant tension. This should not occur in an entropion correction procedure (**Figure 3**).

Combination modified HC with permanent LCC

Once the HC procedure has been complete, the upper and lower eyelid margins are excised at the lateral canthus by tenotomy scissors for 2mm to 3mm along each lid and for 1mm to 2mm back from the margins.

The lid margins are approximated in a single layer closure of simple interrupted suture 6/0 polyglycolic acid or poliglecaprone 25, and then supported at the medial end by a temporary tarsorrhaphy of 4/0 nylon, to be removed after two weeks (**Figures 4 and 5**).

The permanent LCC prevents the lower eyelid from inverting by shortening the effective lid length.

Concomitant disease



Figure 4. Right eye with lower eyelid entropion prior to surgery.

Other ocular diseases are often present in feline entropion cases and must be addressed at the same time. These include conjunctivitis, corneal ulceration and possible corneal sequestrum formation.

Corneal sequestra form as a result of chronic trauma to the feline cornea and will usually form in the cornea adjacent to the entropion site. The classical brown discolouration can range from a faint, diffused tea colour to a profound black plaque.

Varying degrees of corneal vascularisation with overlying corneal ulceration may also accompany the corneal sequestrum⁸.

Corneal sequestra should be removed at the same time as the entropion surgery with a superficial keratectomy under an operating microscope. For deep sequestra, tectonic support in the form of a conjunctival pedicle graft or a corneoconjunctival transposition may be needed. Correction of the underlying entropion issues should prevent a recurrence of the chronic trauma and thus the sequestrum. Referral should be considered for these cases.

A prophylactic LCC in the contralateral unaffected eye may be considered as it has been suggested it will decrease the risk of entropion subsequently developing⁷. In this retrospective study a combination of HC and LCC had the highest success rate (99.21%) for resolving entropion with a single surgery.



Figure 5. Right eye after combination modified Hotz-Celsus with permanent lateral canthal closure surgery.

Forty-six cats presenting with unilateral entropion did not have a prophylactic LCC procedure, and eight (17.39%) developed recurrent entropion within three months of surgery. Fourteen cats with unilateral entropion had a prophylactic LCC surgery on the contralateral eye and none of these cats developed recurrent entropion⁷.

Conclusion

Cats as well as dogs can suffer from entropion. Most feline entropion develops in adults, rather

than in juveniles as in dogs, and sequestra are more commonly seen in aged cats with entropion secondary to ageing retrobulbar fat loss.

In the available literature it is suggested a combined modified HC and LCC is the most successful technique to correct lower eyelid entropion in cats.

A prophylactic LCC in the contralateral, as yet unaffected, eye may decrease the risk of entropion subsequently developing.

Acknowledgement

- This article was reviewed by Claudia Hartley BVSc, CertVOphthal, DipECVO, MRCVS.

References

- 1. Giuliano E A (2006). Basic ocular surgery: adnexa II (V199), *Proceedings Western Veterinary Conference 2006*, University of Missouri-Columbia Columbia, MO.
- 2. Williams D L and Kim J-Y (2009). Feline entropion: a case series of 50 affected animals (2003-2008), *Veterinary Ophthalmology* **12**(4): 221-226.
- 3. White J S, Grundon R A, Hardman C, O'Reilly A and Stanley R G (2012). Surgical management and outcome of lower eyelid entropion in 124 cats, *Veterinary Ophthalmology* **15**(4): 231-235.
- 4. Gould D and McLellan G (2014). *BSAVA Manual of Small Animal Ophthalmology* (3rd edn), BSAVA, Gloucester.
- 5. Gilger B C (2006). Surgery lectures 1. Surgical repair of common eyelid abnormalities, *Proceedings Atlantic Coast Veterinary Conference 2006*.
- 6. Maggs D J, Miller P E and Ofri R (2013). *Slatter's Fundamentals of Veterinary Ophthalmology* (5th edn), Elsevier.
- 7. Read R A and Broun H C (2007). Entropion correction in dogs and cats using a combination Hotz-Celsius and lateral eyelid wedge resection: results in 311 eyes, *Veterinary Ophthalmology* **10**(1): 6-11.
- 8. Cullen C L, Wadowska D W, Singh A and Melekhovets Y (2005). Ultrastructural findings in feline corneal sequestra, *Veterinary Ophthalmology* **8**(5): 295-303.