

Injuries in dogs' eyes caused by cat claws

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SUMMARY

Ocular injuries caused by cat claws are common and carry a guarded prognosis. Important prognostic factors include the depth of the injury, time from injury to proper treatment, and eventual complications. If left untreated, such injuries may lead to destruction of the eye and permanent blindness.

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Introduction

Ocular injury after an unfriendly meeting with a cat is not an uncommon entity. Injuries caused by cat claws are more common in puppies than in older dogs. The cause may be that the menace reaction is not fully developed until the puppy is around three months old. Thus, the puppy will not react to the cat paw by retracting or blinking [2,5]. The severity of the injury may not be obvious initially, thus, it may be ignored by the owner. But until proven otherwise, all injuries caused by cat claws are to be considered penetrating. This implies that the complication risk is high and that such injuries should be treated as soon as possible.

The injury can be divided into three categories.

1. The cat claw has hit its target but only the conjunctiva, upper, lower and third eyelid(s) are injured
2. The cat claw has hit the cornea and caused corneal perforation
3. The cat claw has perforated the cornea with concurrent perforation of the iris and/or anterior lens capsule

Examination and diagnosis

To establish an exact diagnosis, the eye and adnexa (area around the eye) should be thoroughly examined. Sedation may be necessary if the animal is upset or is unwilling to open the eyelids. However, ventral rotation of the globe in sedation may complicate the examination.

The examination should include measurement of tear production by Schirmer Tear Test. This may seem unnecessary, but there are several dog breeds described with early developing keratoconjunctivitis sicca. Lowered tear production will affect wound healing and is therefore of prognostic significance.

The eye should be examined with the use of a focal light source and magnification in a dimly lit room. Practical equipment includes a head loupe and the otoscope light or a Finoff transilluminator. Slit lamp-biomechanics is the optimal method, but the required instrument is often not available in smaller clinics. One should examine the eyelids, conjunctiva and especially the third eyelid thoroughly, as injuries here are often overlooked. One should also remember that the claw can be torn off during the blow and remain hidden under one of the eyelids.

The cornea should be examined from front, from above and from the sides. One should not forget the part that is hidden

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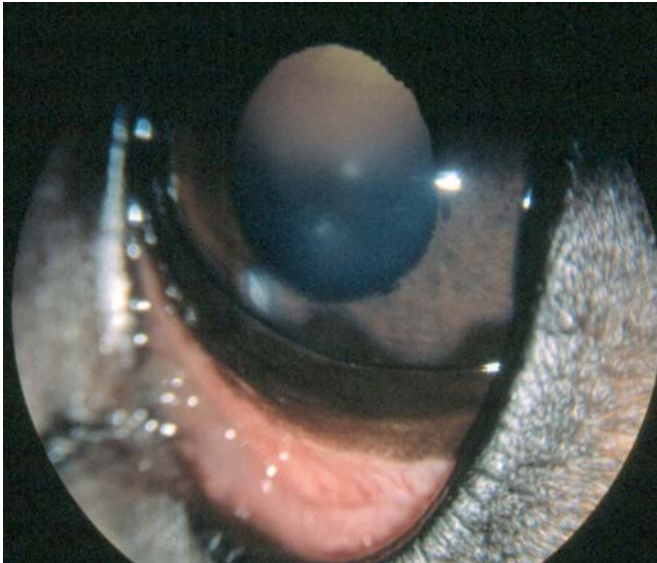


Fig. 1 Fresh, perforating injury partly hidden beneath the third eyelid. Topical atropine treatment has been initiated and the pupil is dilating



Fig. 2 One day old perforating injury. The pupil has been dilated by use of topical atropine. Corneal oedema complicates visibility of the intraocular structures.

beneath the third eyelid (Fig. 1). Illuminating the cornea from the side allows for a better visualisation of eventual injuries of the anterior chamber. Examination from the side is also important if some time has passed since the event and there is substantial corneal oedema that complicates the examination (Fig. 2).

Intraocular changes that may be present include

- Haemorrhage due to perforation of iris
- Prolapsed iris tissue through the corneal laceration
- Lens material in the anterior chamber due to rupture of the lens capsule

Fresh haemorrhage can be observed directly if there is little corneal oedema. Iris prolapse is diagnosed by shining the light onto the eye from the side and observing the iris adhering to the backside of the cornea. In case of protrusion, the (normally) dark iris can be observed in the laceration (Fig.3).

Especially in puppies, it can be difficult to determine whether the lens capsule is perforated or not. The lens is fairly soft in the puppy, thus, lens material leaking out from a rupture can be difficult to distinguish from the surrounding aqueous or from material from the vitreous. In older dogs the lens proteins in the cortex contain less water and the lens material leaking out has the appearance of an opaque, mushroom-shaped opacity in the anterior chamber. When the cornea is perforated, the pupil constricts. The small pupil makes it difficult to observe a rupture of the anterior lens capsule, as it may be hidden behind the constricted iris. To obtain a full overview, the pupil should be dilated, both as part of the examination and as initial medical treatment.

Staining of the injury with fluorescein-Na is routinely performed, but should not be carried out until after a thorough initial examination in which a full overview of the deeper structures is obtained. Most often, a corneal injury can be observed without

staining. However, important additional information is obtained regarding whether the cornea has been perforated or not. While shining the light on the cornea (preferably with ultraviolet light as it shows the staining more clearly), the cornea is pushed *gently*. If the cornea has been perforated, one might observe a tiny stream of aqueous humour leaking from the wound through the stain. This test is termed the "Seidel-test" and is a useful method if corneal perforation is suspected.

Measuring intraocular pressure (IOP) is also important in the evaluation of a case. There is a significant lowering of IOP if the cornea has been perforated. If the perforation has been plugged with fibrin and has stopped leaking, the IOP will still be lowered in most cases due to a concurrent uveitis, due to the breakdown of the blood-aqueous barrier. Classical signs in uveitis are miosis (constricted pupil) and lowered IOP. Iris oedema is usually not significant in an acute injury, but is more common in uveitis caused by other factors.

Treatment

Conjunctival lacerations are usually not necessary to suture, unless the injury is significant. If, however, the third eyelid has been injured, suturing should be considered. The sutures should not be placed so that they rub on the cornea. Lacerations affecting the rim of the eyelid should be closed with an 8-suture. Superficial corneal wounds may not require suturing, however, such wounds are unfortunately uncommon after cat claw attacks. Suturing should be considered if the wound is deep and is affecting most of the stroma.

Perforating wounds

The principles for treatment of corneal perforations include wound treatment, prophylaxis against infection, treatment of uveitis, pain and eventual complications.



Fig. 3 Perforating corneal wound at the limbus in an eight-week old dog. The dark iris tissue protrudes through the defect.

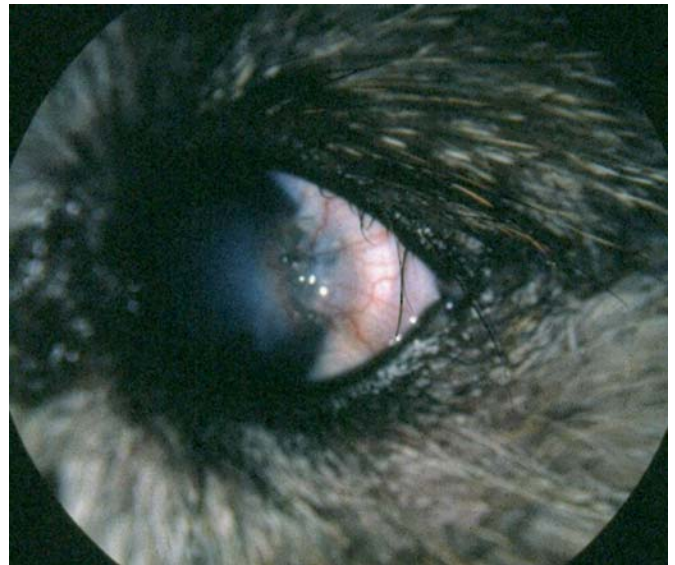


Fig. 4 The same dog as in Fig. 3. The wound has been closed in two layers by suturing the cornea and placing a conjunctival flap.

Pinpoint and small perforating ulcers may not require suturing, as they are often sealed by a fibrin clot. However, if in doubt, it may be better to put in a few sutures than to leave it as an open wound. The suture is put through 2/3 of the corneal thickness with thin suture material (7-0 or thinner) with a spatula needle. Absorbable suture material does not require the stitches to be removed later. The stitches should not be tied too tightly, but sufficiently to prevent aqueous leakage between them. If the wound is large or with tissue loss making the wound difficult to close, a conjunctival flap or other "bandaging", for instance Vet BioSist™ is sutured to the wound edges after closure of as much as possible of the cornea (Fig. 4). Enlargement is recommended for corneal suturing. The optimal equipment is an operating microscope, however magnifying glasses may be of valuable help. Positioning of the eye during suturing is obtained either by holding sutures, or by a small dosage of a muscle relaxant if good monitoring of anaesthesia can be obtained (e.g. pancuronium 0.01-0.02 mg/kg) [5]. An attempt should be made to reposition a protruding iris, and after suturing the eye can be reformed with 0.2-0.3 ml of a viscoelastic material for intraocular surgery, Balanced Salt Solution or Ringer acetate. Lateral canthotomy, with enlargement of the eyelid opening may be indicated for better access to the surgical field. After closure of the corneal wound, the canthotomy is closed in two layers. The canthotomy sutures should remain for two weeks.

Broad-spectrum antibacterial treatment is administered topically and systemically. Ideally, the choice of antibiotic should be made based on sampling result, however, this is not practically possible as antibacterial treatment should be started immediately. If the wound is older and contaminated, a swab for Giemsa stain and culturing should be taken.

Uveitis and pain treatment is initiated with topical atropine 0.5-1% every hour until the pupil is dilated. Later, atropine is administered twice a day until the situation is stable. Atropine

treatment should be started during the consultation to monitor the effect.

Choice of treatment to control pain and uveitis depends on the severity of the corneal laceration. If there is only a small ulcer, there are no complications and treatment is initiated early, systemic treatment with a non-steroidal anti-inflammatory agent (NSAID) may be sufficient. Topical NSAIDs may be considered, but one should remember that wound healing may be delayed [6,7]. If the wound has been sutured and/or there are significant intraocular changes, steroids should be administered systemically in immunosuppressive doses. Topical steroid treatment delays wound healing, but may still be considered if the wound has been sutured, to replace systemic steroids. For topical treatment the ability of the preparation to penetrate the cornea should be taken into consideration. Dexamethazone is more potent, while prednisolone acetate has better corneal penetration [8]. Re-evaluation after start of treatment is important, either the following day or within a few days to control effect of treatment. Rechecks are also important to determine when steroid treatment can be tapered. The degree of injury determines whether additional pain treatment should be administered. One should remember, however, that surgeries of the eye and adnexa are painful procedures.

When all medical treatment has been stopped, the dog should be re-examined after a week to ensure that there is no decrease in intraocular pressure as sign of recurrence of the uveitis. The normotensive eye is used as control. Anti-inflammatory treatment should be continued until the intraocular pressure is back to normal.

In earlier days, suturing the third eyelid over the eye as a "bandage" was frequently used. This does not, however, shorten the wound healing time, but it prevents the veterinarian from controlling the ocular changes and the effect of treatment.



Fig. 5 Two months after a penetrating injury with concurrent laceration of the anterior lens capsule. There is synaechia between the cornea, iris and lens. Cataract is present in the anterior cortex, and the nucleus is clearly visible because of the loss of cortical material.

Complications

The two most important complications after a cat claw injury include penetration through the anterior lens capsule and substantial intraocular haemorrhage. Small lens capsule ruptures may seal off spontaneously and only result in moderate cataract formation (Fig. 5). Regardless, however, lens capsule rupture results in a severe, so-called phacoclastic uveitis [2,9], which needs to be controlled by the use of steroids. It has been reported that injuries less than 1.2 mm long may be treated medically, while larger injuries with extrusion of lens material into the anterior chamber should be treated surgically [9]. The optimal method in large lens capsule ruptures is phacoemulsification. The time aspect is important, however, as rapidly developing corneal oedema complicates surgery.

Large intraocular haemorrhage may be resorbed spontaneously. If there is concurrent formation of fibrin, this can be dissolved by use of tissue plasminogen activator (tPA) injected into the anterior chamber 1-2 days after the injury occurred [5,10]. tPA (Actilyse® Boehringer Ingelheim, diluted to 250 µg/ml, 0.1ml) dissolves fibrin within a few hours, but should not be used if there is still active haemorrhage present. The diluted preparation can be stored at minus 80° C.

If treatment is delayed, or in cases of extensive injury, uncontrollable uveitis may develop. Because of the clogging of the iridocorneal angle with inflammatory debris, there is always a risk of secondary glaucoma. In addition, lens injury or long-standing uveitis are both causes of secondary cataract [9].

References

- [1] BUSSIERES (M.), KROHNE (S.G.), STILES (J.), TOWNSEND (W.M.) - The use of porcine small intestinal submucosa for the repair of full-thickness corneal defects in dogs, cats and horses. *Vet Ophthalmol* 2004; **7**: 352-59.
- [2] GAROSI (L.) - The neurological examination. Platt SR, Olby NJ eds. BSAVA Manual of canine and feline neurology. Gloucester, UK: BSAVA, 2004: 1-23.
- [3] GERDING (P.A.), ESSEX-SORLIE (D.), VASAUNE (S.), YACK (R.) - Use of tissue plasminogen activator for intraocular fibrinolysis in dogs. *Am J Vet Res* 1992; **53**: 894-6.
- [4] MATHIS (G.A.) - Clinical pharmacology and therapeutics. Gelatt KN, ed. *Veterinary Ophthalmology* 3rd Ed. Philadelphia: Lippincott Williams & Wilkins 1999: 291-354.
- [5] SPIESS (B.M.), RÜHLI (M.B.), BOLLIGER (J.) - Augenverletzungen durch Katzenkrallen beim Hund. *Schweiz Arch Tierheilkd* 1996; **138**: 429-33.
- [6] SUGAR (J.) CORNEAL PERFORATIONS. TASMAN (W.), JAEGER (E.A.) - eds. *Duane's Clinical Ophthalmology on CD-Rom* 2004 edition. Philadelphia: Lippincott Williams & Wilkins 2004; Vol 6, Ch 32.
- [7] TANI (E.), KATAKAMI (C.), NEGI (A.) - Effects of various eye drops on corneal wound healing after superficial keratectomy in rabbits. *Jpn J Ophthalmol* 2002; **46**: 488-95.
- [8] VAN DER WOERDT (A.) - Lens Lens-induced uveitis. *Vet Ophthalmol* 2000; **3**: 227-34.
- [9] WEAVER (C.S.), TERRELL (K.M.) - Update: Do ophthalmic nonsteroidal anti-inflammatory drugs reduce the pain associated with simple corneal abrasion without delaying healing? *Ann Emerg Med* 2003; **41**: 134-40.
- [10] WILKIE (D.A.), GEMENSKY-METZLER (A.J.) - Agents for intraocular surgery. *Vet Clin North Am - Small Anim Pract* 2004; **34**: 801-23.