Received: 22 March 2023 | Revised: 7 June 2023 | Accepted: 15 June 2023

DOI: 10.1002/vrc2.663

Vet Record CaseReports

CASE REPORT

Companion or pet animals

Bilateral corneal ulceration in a cat after general anaesthesia

Sebastian Thenhaus-Schnabel | **Teresa Bilotta** | **Christine Watte** | **Olivier Louis Levionnois**

Vetsuisse Faculty, University of Bern, Bern, Switzerland

Correspondence
Sebastian Thenhaus-Schnabel, Vetsuisse Faculty, University of Bern, Laenggassstrasse 128 3012 Bern, Switzerland.
Email: sebastian.schnabel@unibe.ch

Abstract

General anaesthesia is accompanied by a loss of the blink reflex, decreased tear production, inability to close the eye and decreased stability of the tear film. Protection of the eye with corneal lubricant is standard during general anaesthesia, but clear recommendations are missing. Moreover, the anaesthetic event may trigger other factors that increase susceptibility to corneal ulceration. In this case report, we describe a clinical case of bilateral corneal ulceration in a cat following general anaesthesia. We discuss how our practice may be improved, and examine the possibility that feline herpes virus resurgence during veterinary care may be a risk factor for corneal lesions.

KEYWORDS

anaesthesia, artificial tears, cat, dry eye, eye ointment

BACKGROUND

General anaesthesia reduces the eyelid blink reflex, decreases tear production and impairs the protective function of the tear film.[1–4] The exposed and dried cornea is more susceptible to abrasion or ulceration.[5] This depression of tear production seems to be prolonged in the post-anaesthetic phase.[6] As a consequence, the application of corneal lubricant is largely recommended in guidelines for peri-anaesthetic care.[7,8] However, there is only sparse information in the scientific literature about incidence, severity and complications due to corneal ulceration occurring in veterinary patients during an anaesthetic event.

Corneal ulceration refers to the development of a defect of the corneal epithelium involving the underlying stroma, and is commonly accompanied by infection. In contrast, a corneal abrasion is a milder injury that only affects the surface of the cornea, resulting in a mild defect or scratch. In humans, an incidence of 1:25 patients (4%) has been reported for corneal abrasion under general anaesthesia, even when protective eye ointment is used. However, only 1:2800 (<0.04%) will suffer symptoms after anaesthesia, and even less will develop severe lasting complications.[9] Methods and risk factors for protection against corneal abrasion have been partly investigated, but clear guidelines are still lacking.[10–12]

In dogs, the incidence of corneal abrasion is reported to be between 1.9% and 20%, with anaesthesia duration reported as an exacerbating factor, in particular, if longer than approximately 2 hours.[6,13–16] Corneal epithelial defects are reported to heal rapidly, while occurrence of severe corneal ulceration remains rare. The most frequently reported protective measure against corneal drying and abrasion is the application of eye gel or ointment. However, no comparison studies have been performed and the frequency of application as well as the nature of the ointment have been insufficiently investigated.[6,16] Eye taping (applying tape to closed eyelids) is often reported in humans, but not in anaesthetised animals. In a prospective study investigating the use of eye taping in addition to a single administration of eye lubrication, no benefit was observed for a mean anaesthesia duration of 80 minutes.[16] In fact, there is no standardised procedure. In cats, the situation is similar. There is also evidence for the reduction of tear production during and after general anaesthesia and the necessity for eye protective measures.[17,18] However, incidence of corneal abrasion is not known in cats. In addition, herpesvirus infection is prevalent in cats, and may predispose to or exacerbate ophthalmologic disorders, but no information is available regarding interaction with post-anaesthetic corneal abrasion in cats.[19]

This report describes a case of severe bilateral corneal ulcerations in a cat that initially presented with corneal abrasions after undergoing general anaesthesia.

CASE PRESENTATION

A 13-year-old, neutered, female, European, domestic shorthair cat, weighing 4.8 kg, was referred to our veterinary hospital to clarify the suspicion of an intrathoracic mass noted

on chest radiographs. The cat was diagnosed with epilepsy 12 years previously; since then, it has been receiving phenobarbital (2.5 mg per os [PO] twice daily) without recurrence of its initial seizure episode. No other disease was reported by the owner. General examination was limited due to anxious behaviour of the cat, but no anomalies of the physical status or laboratory blood results were observed. The cat was scheduled for computed tomography (CT) scan and ultrasound-guided needle biopsy of the thoracic mass.

Sedation was induced with butorphanol (0.2 mg/kg; Morphasol-10, Dr. E. Graeub, Switzerland) and medetomidine (0.006 mg/kg; Domitor, Orion Corporation, Finland) administered intramuscularly (IM). After placement of an intravenous catheter in the right cephalic vein and preoxygenation for at least 2 minutes via face mask, general anaesthesia was induced with propofol (1 mg/kg intravenously [IV]; Propofol MCT, Fresenius Kabi, Switzerland), followed by endotracheal intubation with a cuffed 4.0-mm endotracheal tube (Dispovet, Netherlands).The endotracheal tube was connected to a circle breathing system (Avance CS2, GE Healthcare, Finland), and anaesthesia maintained with 1.1%–1.5% (end-tidal) isoflurane (Attane, Piramal Pharma, India) in oxygen-enriched air (0.55 inspired oxygen fraction), with the cat positioned in sternal recumbency during the entire anaesthesia. The cornea was moistened with eye ointment containing retinyl palmitate (Vitamin A Blache, Bausch & Lomb Swiss, Switzerland). Pressure-controlled ventilation was initiated and adjusted to maintain an end-tidal carbon dioxide partial pressure ($ETCO_2$) close to 40 mmHg. Heart rate, respiratory rate, $ETCO_2$, spirometry and peripheral pulse oximetry (SpO_2) were monitored continuously (Carescape Monitor B450, GE Healthcare, Finland). Arterial pressure was measured at repeated interval at the left radial artery using oscillometric sphygmomanometry (SunTech Vet 25, SunTech Medical, USA). After 40 minutes of general anaesthesia, glycopyrrolate (0.01 mg/kg IV; Robinul, Riemser Pharma, Germany) was administered to increase heart rate and arterial pressure. To improve the quality of the thorax scan, an inspiratory hold was maintained once for approximately 40 seconds, with a peak inspiratory pressure of approximately 12 cmH_2O. The CT imaging revealed a diaphragmatic rupture, with limited herniation of suspected abdominal fat and omentum into the thorax. This was most probably chronic and there was no other identifiable thoracic mass. A liver nodule was identified and a fine-needle aspiration performed under ultrasonography. During general anaesthesia, the cat received ringer's acetate (3 mL/kg/h IV; Ringer-Acetat, Fresenius Kabi Schweiz, Switzerland). Blankets and warm water bottles were used to reduce hypothermia; the peripheral body temperature of the cat was 36.8°C by the end of anaesthesia. Eye ointment was re-applied once bilaterally approximately 45 minutes after induction of anaesthesia. The total duration of anaesthesia was 75 minutes. The cat was extubated after the onset of the swallowing reflex, and was monitored until it was considered fully awake. Cytology of the liver nodule revealed a moderate vacuolar hepatopathy of lipid type.

That evening, a slight blepharospam of the left eye (OS), with moderate anisocoria, was noticed by the responsible veterinary surgeon at visual inspection without detectable corneal abrasion after fluorescein staining, while the right eye (OD) was judged normal. Eye ointment (Vitamin A Blache) was continued every 4 hours in both eyes. The fluorescein dye test became positive OS on the following day.

LEARNING POINTS/TAKE-HOME MESSAGES

- The eye needs protection during and after an anaesthetic event.
- Severe ocular disease may develop in association with a stressful procedure, and should be communicated to the owner during informed consent.
- As early recognition and treatment may mitigate chronic symptoms and recurrence, close monitoring during the early post-anaesthetic phase should be considered, including Schirmer tear test and fluorescein tests, before the animal is discharged.

The cat was discharged from the hospital, and the owner was instructed to apply vitamin A ointment every 4 hours in both eyes. The discharge 1 day after the anaesthetic event is considered our time reference, T_0, for further descriptions. The owner reported some short episodes of sneezing over the following days without further respiratory symptoms, while mild blepharospasm and mucoid discharge continued. However, detailed information from the owner is missing.

The cat was examined by a general practitioner at T_0+14 days. The Schirmer tear test (STT) was 4 mm/min OD and 5 mm/min OS. The intra-ocular pressure was within normal range (<20 mmHg) for both eyes (OU) and the fluorescein dye test was positive OU. The main diagnosis was bilateral ulcerative keratitis secondary to eye dryness. The medical treatment prescribed at this time was hyaluronic acid ocular gel (Remend gel, Elanco, Germany), tobramycin 0.3% drops (Tobrex, Novartis Pharma Schweiz, Switzerland), carbopol gel (Ocry-gel, Virbac, Switzerland) and Trifluridine 1% drops (Virophta, Horus Pharma, France). The latter was indicated because of a suspicion of herpesvirus relapse. At recheck 6 days later (T_0+20 days), the left eye was fluorescein negative, but the right eye was still fluorescein positive. The cat was examined weakly, without improvement. STT was maintained below 5 mm/min OU.

At T_0+55 days, an epithelial debridement was performed on the right eye using a povidone-iodine-soaked cotton swab. Medical treatment twice daily OU was continued with hyaluronic acid ocular gel (Remend gel, Elanco, Germany), oxytetracycline ointment (Oxytetracyclin-Augensalbe, Jenapharm, Germany) and ketorolac (Acular, AbbVie, Switzerland) were added, as well as famciclovir (125 mg PO; Famvir, Future Health Pharma, Switzerland), while trifluridine was interrupted. Severe bilateral eye dryness remained over the next months, with STT < 5 mm/min OD, while STT increased progressively to 10 mm/min OS.

At T_0+78 days, a brown stromal discoloration was observed OD. At T_0+85 days, a third eyelid flap was performed OD and maintained for 28 days. Following removal of the third eyelid flap, corneal changes had remained unchanged and the general practitioner referred the cat back to our hospital for ophthalmological examination and advice.

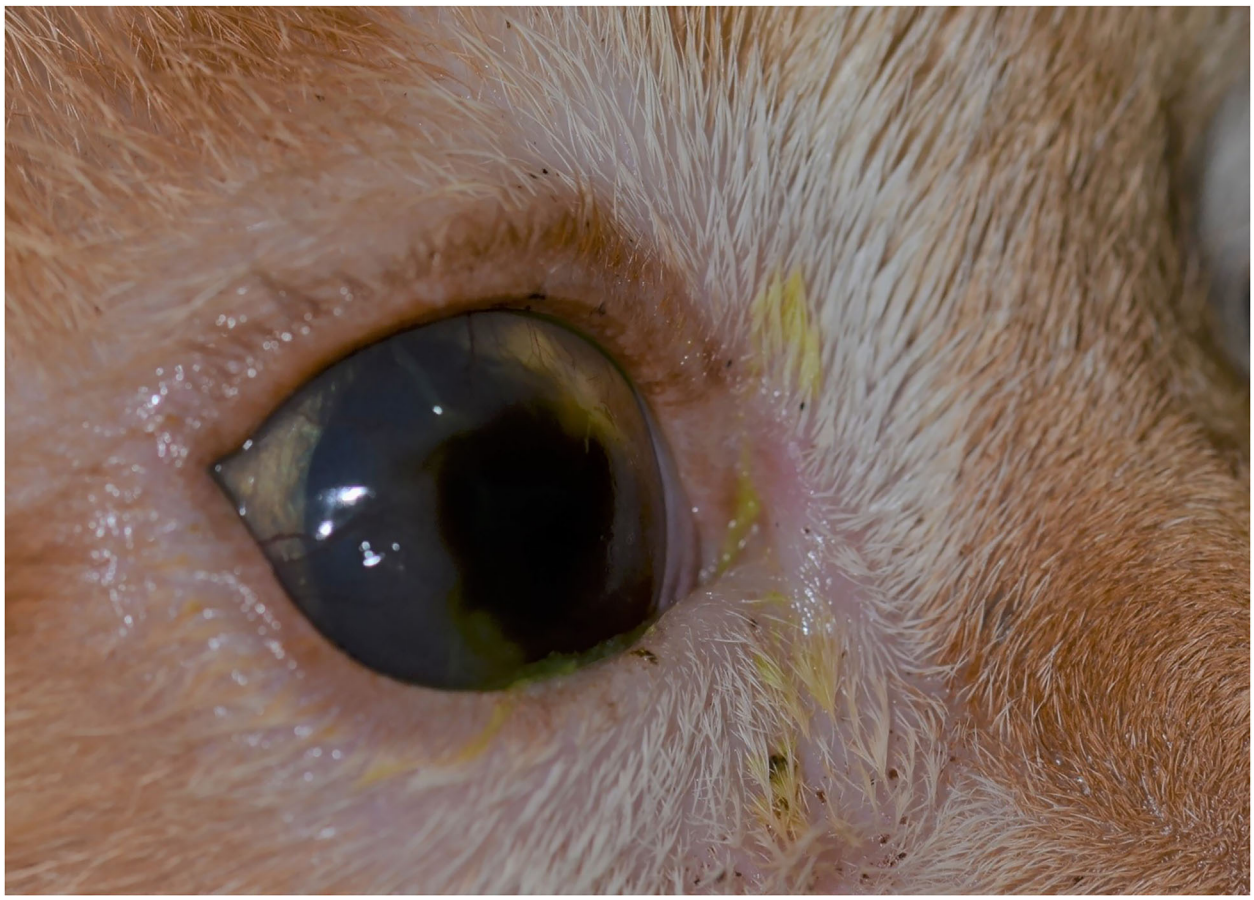

FIGURE 1 Photograph of the right eye showing a central dark brown stromal discoloration. Anterior stromal vessels are present in all corneal quadrants. Mild blepharospasm, conjunctival hyperaemia and fluoresceine staining are more difficult to appreciate on the photograph.

The next ophthalmological examination was performed at T_0+162 days. It was unremarkable for the left eye. The right eye showed normal ocular reflexes. Mild blepharospasm and conjunctival hyperaemia were present. The cornea showed loss of the epithelial layer over approximately 50% of the central cornea, and the exposed stroma had taken on a dark brown discoloration (Figure 1). Fluorescein staining was delineating the epithelial defect. Anterior stromal vascularisation was noted in all four corneal quadrants and reached the margins of the ulcer. Further detailed intraocular examination including biomicroscopy, indirect ophthalmoscopy and rebound tonometry was found to be within normal range.

DIFFERENTIAL DIAGNOSIS

A diagnosis of ulcerative keratitis and corneal sequestrum OD was made.

TREATMENT

Several surgical and non-surgical treatment options were discussed with the owners, who elected to continue conservative topical therapy (remend, oxytetracyclin and vitamin A, thrice a day).

OUTCOME AND FOLLOW-UP

At the time of writing this report, the right eye remains stable without significant healing, and medical therapy is ongoing.

DISCUSSION

This case reports the occurrence of persistent corneal ulcers after general anaesthesia in a cat. Specific scientific literature on the incidence of peri-anaesthetic corneal abrasions in cats is missing. Based on literature from other species, corneal abrasion may be common after general anaesthesia despite the use of preventive treatment, but of mild intensity, and rapid spontaneous healing can be expected.[9,15,16] In the present case, eye dryness appeared particularly prolonged and may have hindered complete remission.[20] The owners reported good treatment adherence, but this was not controlled, and the cat was not easy to medicate, which may have impacted therapeutic success. An additional limitation is that no pre-anaesthetic STT was performed such that pre-existing reduced tear production cannot be excluded, even if no clinical symptoms were noticed.

The physiological tear film is essential to protect the corneal epithelium.[5,21] In dogs and cats, general anaesthesia significantly increases the risk of corneal defects through reduction of tear production, blinking reflex and eyelid

closure (lagophthalmos).[2,6,13,17,18,22–25] Anaesthetic drugs are hypothesised to affect tear production and the tear film by interacting with the parasympathetic nervous system,[2,26] reducing blood perfusion to the lacrimal gland, altering its metabolism, and changing the composition of the tear film.[27] In humans, the application of ocular ointment during general anaesthesia to maintain the tear film reduces the incidence of corneal ulceration from above 30% to below 5%,[9,12] with similar results in dogs.[6,16] There is only scarce data on the type of eye drops that should be used for peri-anaesthetic protection. In humans, ocular ointments elicit a higher frequency of foreign body sensation, hyperaemia, blepharospasm and blurred vision compared to a clear hydrogel.[1,10] The hydrogel also shows better inhibition of bacterial growth in vitro.[1] In a study comparing the two formulations in cats, the eyes treated with paraffin-containing ophthalmic ointment induced blepharospasm and hyperaemia of the conjunctiva compared to a clear hydrogel.[18] Tear production was reduced for up to 18 hours after anaesthesia in cats,[18] and for 24 hours in dogs.[15] In the present case, it cannot be excluded that the application of paraffin-containing ophthalmic ointment may have played a contributing factor. The application of a clear hydrogel, such as carbopol gel, may be a better option for routine peri-anaesthetic eye moisturisation, unless otherwise indicated.

Eyelid taping/closure is also reported in humans as an effective measure against corneal abrasion, may better protect against direct trauma or drying up of the cornea, and could avoid the use of an ocular ointment or hydrogel altogether (avoiding its best composition and its application frequency).[12,28,29] Eye taping is not commonly used in animals. In dogs, no significant difference was observed with or without eye taping in addition to ocular lubrication.[16] Moreover, maintaining eye taping over long time period in animals is more difficult due to their fur. Further studies are required to better understand which preventive measures may be the most effective.

Some risk factors have been described in dogs and humans that may favour the occurrence of post-anaesthetic ocular ulcers. Among those, duration of anaesthesia, positioning, age, procedure and head conformation (e.g., brachycephaly) have been mentioned.[9,14,15,30,31] Directly blowing warm forced air close to a patient's head (without dedicated blanket) also appears to be a reasonable contributing factor to dry eye, and should be avoided. The cat of the present case did not have any of these predisposing factors (young, normocephalic, sternal recumbency, no forced air, short procedure and so forth). Another relevant risk factor seems to be the drugs used for general anaesthesia,[22,23,27] while there is no knowledge on how the choice of these drugs influences the outcome. Opioid drugs have been shown to contribute to prolonged reduction of tear production in dogs, potentially impairing post-anaesthetic healing of corneal abrasions, even though their contribution compared to other factors has not been well determined.[4,25,27,32] More specifically, butorphanol showed synergistic reduction of tear production when administered with alpha-2 agonist sedatives in dogs.[27] It remains unclear if the butorphanol administered once in this cat could have played a significant role in the prolonged eye dryness observed.

Glycopyrrolate, which is known to impair tear production, was also administered once intravenously. In dogs, reduced tear production was observed 20 minutes after administration of glycopyrrolate (0.01 mg/kg IM) and lasted up to 24 hours.[26] The effect was shorter in cats receiving atropine.[33] Therefore, application of eye gel has been recommended when using parasympatholytics.[26]

The development of prolonged eye dryness, ulcerative keratitis and corneal sequestration in the present case also includes ophthalmic manifestation of feline herpesvirus infection as a differential diagnosis.[19] Serological studies show that feline herpes virus 1 (FHV-1) is widespread in the feline population worldwide, with reported exposure rates up to 97%.[34] After acute exposure, a persistent infection develops, with lifelong viral latency in the trigeminal ganglia, which can be reactivated during a period of stress. Many stress factors have been described in the literature, such as infection, change of housing, systemic corticosteroid administration, or surgical and diagnostic procedures.[35,36] The cat, in the present case, displayed stressed behaviour during initial exam. More generally, a stay in a veterinary hospital that included a general anaesthesia and possibly discomfort was most certainly stressful, and may have triggered latent virus infection. While there is no evidence for post-anaesthetic ocular manifestation of FHV-1, this is a differential diagnosis commonly considered by veterinary practitioners. The feline herpes virus may affect corneal protection.[37] Occurrence of metaherpetic disease, including hypoesthesia and quantitative/qualitative tear film deficiency, has been reported in cats.[38]

While protection of the eye during an anaesthetic event is considered an essential basic standard, there is not enough evidence to recommend a particular product, its amount, frequency and duration. Moreover, while severe ocular disease remains rare, the present case suggests that its possible occurrence despite standard care may occur and may be communicated to the owner during informed consent. Awareness for reduction of stress elicited to the sick animal in association with a veterinary visit is also raising,[39] including evidence for increased anaesthetic requirement potentially as a result of stress.[40]

The recognition and early treatment of post-anaesthetic eye disease may help mitigate the development of long-lasting recurrent symptoms. Therefore, it is important to consider close monitoring during the early post-anaesthetic phase, including STT and fluorescein staining tests, before discharging the animal if clinical symptoms have been noticed.

AUTHOR CONTRIBUTIONS

Sebastian Thenhaus-Schnabel: veterinary care of the described case, literature search and manuscript writing. Olivier Louis Levionnois: supervision of the anaesthetic event and manuscript editing. Teresa Bilotta and Christine Watte: ophthalmologic examination, treatment and manuscript editing.

ACKNOWLEDGEMENTS

The authors acknowledge Shannon Axiak-Flammer for her help in editing the manuscript.

Open access funding provided by Universitat Bern.

CONFLICT OF INTEREST STATEMENT

All authors declare they have no conflicts of interest.

FUNDING INFORMATION

The authors received no specific funding for this work.

ETHICS STATEMENT

This is a clinical case. The owner signed consent for treatment as well as for use of patient data.

ORCID

Sebastian Thenhaus-Schnabel https://orcid.org/0009-0009-6810-0191

REFERENCES

1. Smolle M, Keller C, Pinggera G, Deibl M, Rieder J, Lirk P. Clear hydrogel, compared to ointment, provides improved eye comfort after brief surgery. Can J Anaesth. 2004;51(2):126–9.
2. Vestre WA, Brightman AH 2nd, Helper LC, Lowery JC. Decreased tear production associated with general anesthesia in the dog. J Am Vet Med Assoc. 1979;174(9):1006–7.
3. Krupin T, Cross DA, Becker B. Decreased basal tear production associated with general anesthesia. Arch Ophthalmol. 1977;95(1):107–8.
4. Raušer P, Novák L, Mrázová M. Influence of anaesthetics on aqueous tear production in dogs: a systematic review. Vet Anaesth Analg. 2022;49(6):525–35. https://doi.org/10.1016/j.vaa.2022.08.007
5. Holly FJ, Lemp MA. Tear physiology and dry eyes. Surv Ophthalmol. 1977;22(2):69–87
6. Di Palma C, Micieli F, Lamagna B, Nieddu A, Uccello V, Fatone G, et al. Schirmer tear test value and corneal lesions' incidence during general anesthesia for non-ophthalmic surgery in non-brachycephalic dogs: a pilot study comparing three different lubricant eye drop formulations. Vet Sci. 2020;7(1):25.
7. Warne L, Bauquier S, Pengelly J, Neck D, Swinney G. Standards of care anaesthesia guidelines for dogs and cats. Aust Vet J. 2018;96(11):413–27.
8. Grubb T, Sager J, Gaynor JS, Montgomery E, Parker JA, Shafford H, et al. 2020 AAHA anesthesia and monitoring guidelines for dogs and cats. J Am Anim Hosp Assoc. 2020;56(2):59–82.
9. Roth S, Thisted RA, Erickson JP, Black S, Schreider BD. Eye injuries after nonocular surgery. A study of 60,965 anesthetics from 1988 to 1992. Anesthesiology. 1996;85(5):1020–7.
10. Bøggild-Madsen NB, Bundgarrd-Nielsen P, Hammer U, Jakobsen B. Comparison of eye protection with methylcellulose an paraffin ointments during general anaesthesia. Can Anaesth Soc J. 1981;28(6):575–8.
11. Grover VK, Kumar KVM, Sharma S, Sethi N, Grewal SPS. Comparison of methods of eye protection under general anaesthesia. Can J Anaesth. 1998;45(6):575–7.
12. Grixti A, Sadri M, Watts MT. Corneal protection during general anesthesia for nonocular surgery. Ocul Surf. 2013;11(2):109–18.
13. Shepard MK, Accola PJ, Lopez LA, Shaughnessy MR, Hofmeister EH. Effect of duration and type of anesthetic on tear production in dogs. Am J Vet Res. 2011;72(5):608–12.
14. Park Y-W, Son W-G, Jeong M-B, Seo K, Lee LY, Lee I. Evaluation of risk factors for development of corneal ulcer after nonocular surgery in dogs: 14 cases (2009–2011). J Am Vet Med Assoc. 2013;242(11):1544–8.
15. Dawson C, Sanchez RF. A prospective study of the prevalence of corneal surface disease in dogs receiving prophylactic topical lubrication under general anesthesia. Vet Ophthalmol. 2016;19(2):124–9.
16. Ioannides J, Parker J, Kumaratunga V, Preston J, Donaldson D, MacFarlane P, et al. A prospective, masked, randomized, controlled superiority study comparing the incidence of corneal injury following general anesthesia in dogs with two methods of corneal protection. Vet Ophthalmol. 2022;25(4):291–6.
17. Di Pietro S, Giannetto C, Falcone A, Piccione G, Congiu F, Staffieri F, et al. Dexmedetomidine and tear production: evaluation in dogs as spontaneous model for ocular surface disorders. Vet Sci. 2021;8(2):28.
18. Köstlin R, Reese S, Pieper K, Peche N. Postanaesthetic tear production and ocular irritation in cats. Tierarztl Prax Ausg K Kleintiere Heimtiere. 2015;43(2):75–82.
19. Nasisse MP. Feline herpesvirus ocular disease. Vet Clin North Am Small Anim Pract. 1990;20(3):667–80.
20. Petroutsos H, Paschides CA, Kitsos G, Skopouli FN, Psilas K. [Sterile corneal ulcers in dry eye. Incidence and factors of occurrence]. J Fr Ophtalmol. 1992;15(2):103–5.
21. Pflugfelder SC, Stern ME. Biological functions of tear film. Exp Eye Res. 2020;197:108115.
22. Aghababaei A, Ronagh A, Mosallanejad B, Baniadam A. Effects of medetomidine, dexmedetomidine and their combination with acepromazine on the intraocular pressure (IOP), tear secretion and pupil diameter in dogs. Vet Med Sci. 2021;7(4):1090–5.
23. Ghaffari MS, Malmasi A, Bokaie S. Effect of acepromazine or xylazine on tear production as measured by Schirmer tear test in normal cats. Vet Ophthalmol. 2010;13(1):1–3. https://doi.org/10.1111/j.1463-5224.2009.00738.x
24. Mouney MC, Accola PJ, Cremer J, Shepard MK, Rodriguez Guarin C, Hofmeister EH. Effects of acepromazine maleate or morphine on tear production before, during, and after sevoflurane anesthesia in dogs. Am J Vet Res. 2011;72(11):1427–30.
25. Volk HA, West E, Linn-Pearl RN, Fricker GV, Panti A, Gould DJ. Effect of methadone and acepromazine premedication on tear production in dogs. Vet Rec Open. 2018;5(1):e000298.
26. Doering CJ, Lukasik VM, Merideth RE. Effects of intramuscular injection of glycopyrrolate on Schirmer tear test I results in dogs. J Am Vet Med Assoc. 2016;248(11):1262–6.
27. Dodam JR, Branson KR, Martin DD. Effects of intramuscular sedative and opioid combinations on tear production in dogs. Vet Ophthalmol. 1998;1(1):57–9.
28. Batra YK, Bali IM. Corneal abrasions during general anesthesia. Anesth Analg. 1977;56(3):363–5.
29. White E, Crosse MM. The aetiology and prevention of peri-operative corneal abrasions. Anaesthesia. 1998;53(2):157–61.
30. Yu H-D, Chou A-H, Yang M-W, Chang C-J. An analysis of perioperative eye injuries after nonocular surgery. Acta Anaesthesiol Taiwan. 2010;48(3):122–9.
31. Cucchiara RF, Black S. Corneal abrasion during anesthesia and surgery. Anesthesiology. 1988;69(6):978–9.
32. Giannetto C, Macrì F, Falcone A, Giudice E, Crupi R, Cicero L, et al. Evaluation of tear production as measured by Schirmer test I in dogs after acepromazine and acepromazine-methadone premedication. Animals. 2021;11(11):3015.
33. Arnett BD, Brightman AH 2nd, Musselman EE. Effect of atropine sulfate on tear production in the cat when used with ketamine hydrochloride and acetylpromazine maleate. J Am Vet Med Assoc. 1984;185(2):214–5.
34. Maggs DJ. Update on pathogenesis, diagnosis, and treatment of feline herpesvirus type 1. Clin Tech Small Anim Pract. 2005;20(2):94–101.
35. Stiles J. Ocular manifestations of feline viral diseases. Vet J. 2014;201(2):166–73.
36. Andrew SE. Ocular manifestations of feline herpesvirus. J Feline Med Surg. 2001;3(1):9–16.
37. Lim CC, Reilly CM, Thomasy SM, Kass PH, Maggs DJ. Effects of feline herpesvirus type 1 on tear film break-up time, Schirmer tear test results, and conjunctival goblet cell density in experimentally infected cats. Am J Vet Res. 2009;70(3):394–403.
38. Sebbag L, Thomasy SM, Leland A, Mukai M, Kim S, Maggs DJ. Altered corneal innervation and ocular surface homeostasis in FHV-1-exposed cats: a preliminary study suggesting metaherpetic disease. Front Vet Sci. 2020;7:580414.
39. Lloyd JKF. Minimising stress for patients in the veterinary hospital: why it is important and what can be done about it. Vet Sci. 2017;4(2):22.
40. Shimizu Y, Kanda T. Effects of pre-anesthesia anxiety on propofol induction dose in cats. Animals. 2021;11(7):2126.

How to cite this article: Thenhaus-Schnabel S, Bilotta T, Watte C, Levionnois OL. Bilateral corneal ulceration in a cat after general anaesthesia. Vet Rec Case Rep. 2023;11:e663. https://doi.org/10.1002/vrc2.663