



Cataract Surgery in Dogs

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ABSTRACT: Owners commonly present to the veterinary clinic with a complaint that their dog's vision has reduced, or their dog's eye(s) appear cloudy and subsequently our veterinary surgeons may diagnose them with having cataracts. Cataracts can form due to a number of reasons including heritage, diabetes mellitus, trauma or ocular disease. This article discusses what a cataract is, patient considerations and surgical removal. I will also discuss the post-operative care following phacoemulsification and what we can do to help with our client's compliance in providing the best care for their pet in the immediate recovery period.

Keywords: Ophthalmology; cataract surgery

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Introduction

The aim of this article is to provide detailed information on cataracts and surgical removal, patient considerations and post-operative care. A glossary containing ophthalmology terms referred to in this article is provided (Figure 1).

The lens of an eye allows light to pass through it to hit the retina at the back of the eye and form a clear image of objects at varying distances (Figure 2).

A cataract is an opacity of the lens or its capsule. The opacity in the lens will stop the light entering the eye properly and therefore affect the patient's vision. Cataract formation is common in dogs. Detailed examination of the lens, allowing a description of the extent of the cataract, its position in the lens and the appearance of the opacity, helps in the classification of a cataract (Peterson-Jones & Crispin, 2002).

A cataract that develops independently of other diseases is known as a "primary" cataract. This is in contrast to a secondary cataract, one that is secondary to another disease (MedicineNet, 2016). A trauma to the eye may also cause a "secondary" cataract.

Inherited cataracts

Most inherited cataracts follow a characteristic pattern in age of onset, part of the lens affected and progression. Posterior polar subcapsular cataracts (PPCs) are the commonest form of inherited cataract inherited in adult dogs. Most PPCs do not appear to have a major impact on vision (Peterson-Jones & Crispin, 2002).

Diabetes

Cataracts develop in 50–70% of diabetic dogs within the first several months of the disease, and not infrequently these patients are presented for cataract surgery (Gelatt & Gelatt, 2001). In diabetic dogs the glucose concentration in the lens increases. The extra glucose is converted into sorbitol, which causes an increase in the influx of water to the lens. The increase in water causes a breakdown of the lens fibres and a resulting cataract. Cataracts in diabetic dogs can develop extremely rapidly even if the dog is well regulated (Bodewes, 2001).

Ocular disease

Underlying causes such as uveitis or glaucoma can cause a cataract due to the inflammation within the eye.

Trauma

If the lens capsule ruptures during a penetrating injury to the eye such as a cat claw or due to a blunt trauma, the lens contents leak out through the hole in the capsule and cause both cataract and a severe immune-mediated reactive uveitis (McCalla, 2001).

Patient considerations for surgery

Following an initial consultation, the veterinary surgeon will determine whether the patient is an ideal candidate for surgery to remove the cataract(s). This surgery is known as phacoemulsification. The aim of the surgery is to improve or restore vision such that quality of life is made as good as possible (Turner, 2005).

Phacoemulsification: A modern cataract surgery in which the eye's lens is emulsified
Uveitis: Inflammation of the uvea or uveal tract
Glaucoma: An eye condition where the optic nerve is damaged by the pressure of the fluid inside the eye.
Retinal Atrophy: Degeneration of the retina
Electroretinography: An eye test used to detect abnormal function of the retina
Entropion: Inward rolling of the eyelid
Keratoconjunctivitis sicca: Dryness of the conjunctiva and the cornea
Mydriatic: An agent that induces dilation of the pupil
Hyphema: Blood in the front chamber of the eye
Iridocyclitis: Inflammation of the iris and of the ciliary body

Figure 1. Ophthalmology glossary.

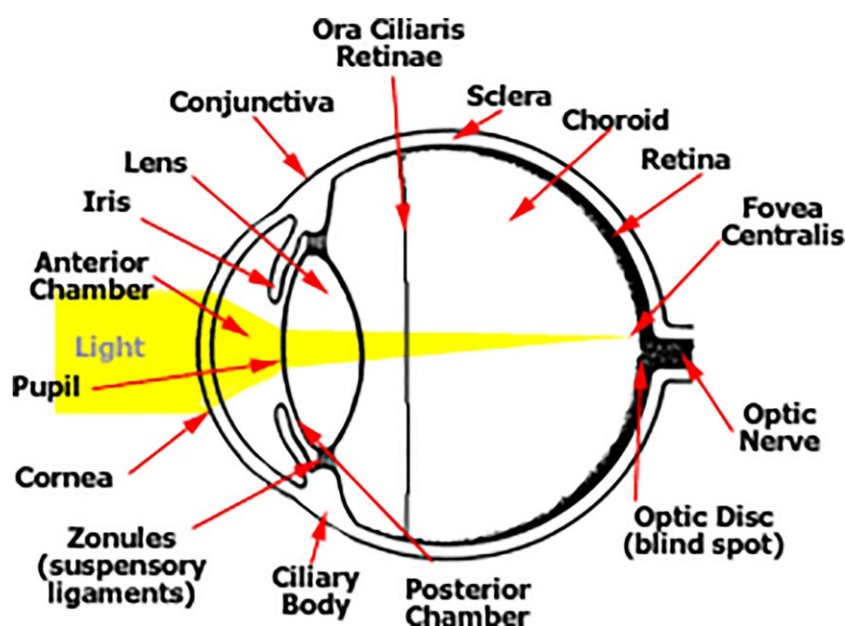


Figure 2. A labelled diagram of an eye to show light travelling through the lens.

There are various patient factors to consider when deciding on surgery, one of them being generalised progressive retinal atrophy (GPRA). The retina contains the photoreceptor cells which are responsible for vision and transmitting nerve impulses to the optic nerve. GPRA will cause secondary cataract formation and, as such, the lens opacity can be wrongly assumed for the loss of vision. If the retina cannot be examined, one must consider electroretinography to determine whether the retina is functional before embarking on any surgery (Turner, 2005).

As well as checking retinal function, the veterinary surgeon must ensure there are no other ocular diseases/problems that could affect the outcome of the surgery. For example, if the patient has entropion, the eyelashes rubbing on the cornea will disrupt healing and may introduce infection into the eye. The patient is also at risk of corneal ulcers. If the patient has keratoconjunctivitis sicca (KCS) then treatment will need to be started before commencing with cataract surgery. The major risk with KCS patients is the anticipated decline

in tear values once the eye is aggressively treated with topical 1% atropine or other mydriatics post-operatively. A cornea, marginally dry and under the influence of topical and systemic corticosteroids, is prone to develop central progressive corneal ulcerations (Gelatt & Gelatt, 2001).

If a cataract is left untreated for some time it can cause intraocular inflammation and glaucoma can develop. In this case cataract surgery may not be possible, so it is important to check the intraocular pressures using a tonometer at the initial consultation.

The patient must be healthy enough to undergo a general anaesthetic. Care must be taken with diabetic patients: general anaesthesia, cataract surgery, and topical and systemic corticosteroids may elevate blood glucose levels; close daily monitoring of the urine and/or blood glucose postoperatively is essential (Gelatt & Gelatt, 2001).

The general behaviour of the dog is important. Animals that are fractious,

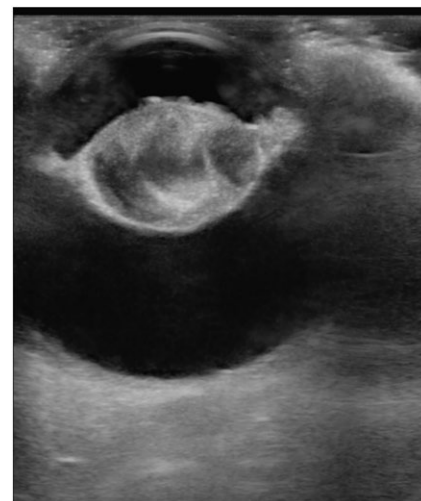


Figure 3. An ultrasound image of a dog's eye with a cataractous lens.

aggressive or highly excitable should be excluded from cataract surgery unless there is some compelling factor. Small animals difficult to control and treat post-operatively are prone to more complications including hyphema, surgical wound dehiscence, more intense iridocyclitis and may be dangerous to the hospital personnel (Gelatt & Gelatt, 2001). The patient will need to be closely monitored post-operatively and the intraocular pressure (IOP) of the eye must be measured to ensure it is not dangerously elevated. The IOP is measured using a tonometer and typically the IOP is measured every 4 hours overnight. If the team are unable to measure the IOP, any increased pressures will not be managed with medications should they need to be and therefore this will affect the outcome of vision in the eye following such a procedure. A continuously raised IOP could result in loss of vision and therefore the surgery would have no beneficial outcome.

Diagnostic tests prior to surgery

Once all of the above factors have been considered and the veterinary surgeon and owner are happy to proceed with the surgical removal of the cataract(s) the patient will be admitted to the hospital for at least one overnight stay. If the patient is diabetic it is helpful to admit them the day before the surgery so that the team has more control over blood glucose readings, feeding and insulin administration prior to an anaesthetic. A thorough history is required on admission to include the patient's usual diet, time of feeding, medications and allergies. At this point, it is good to pre-warn the owners that although

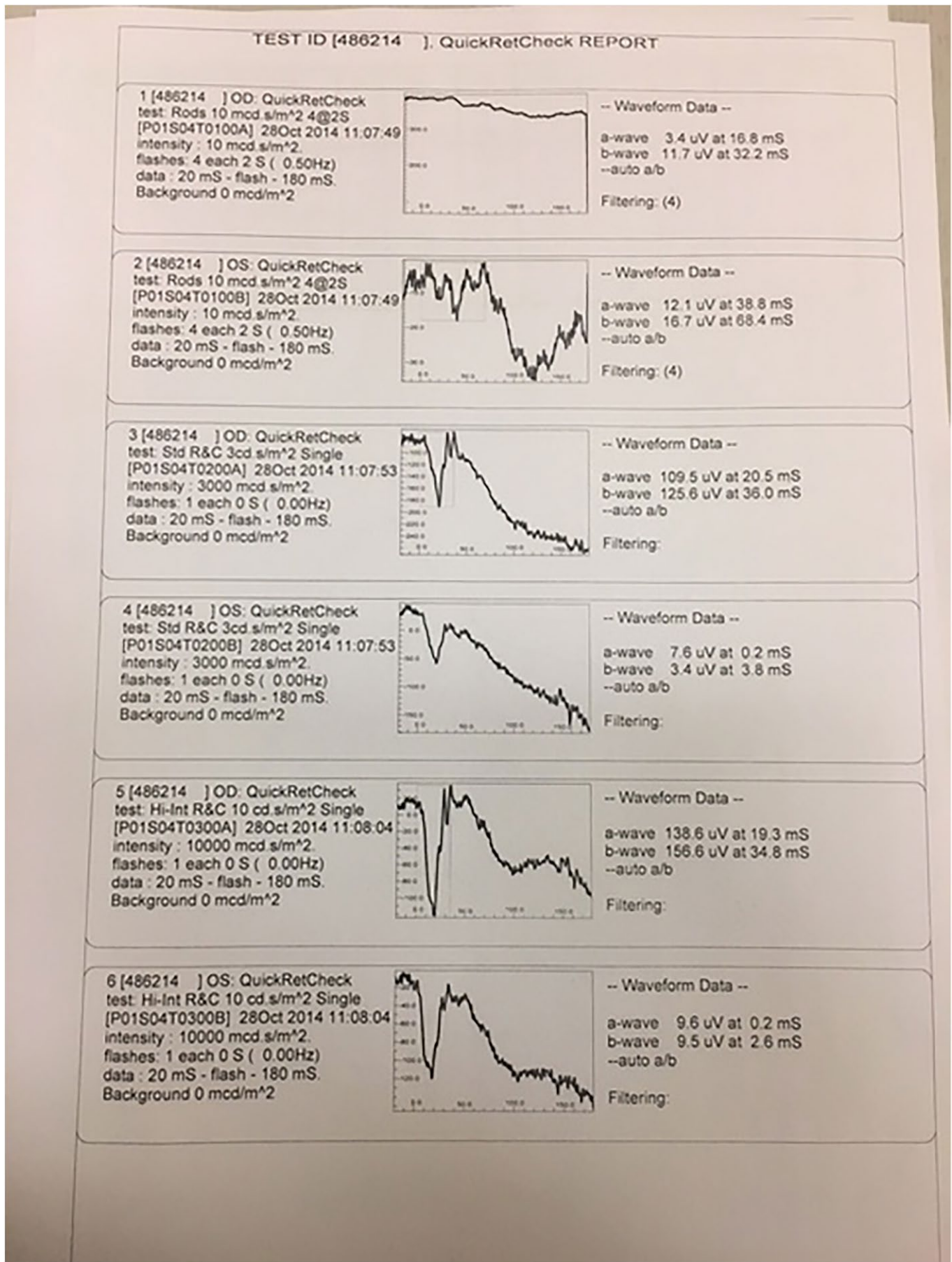


Figure 4. Normal ERG traces with a good prognosis for vision following cataract surgery.

vision is usually present the day after the surgery, due to the amount of inflammation expected within the eyes, the owner may not witness any real change for 1–2 weeks. The owners should also be informed of the very intense aftercare required.

The patient should be prepared for surgery with an intravenous catheter and a blood sample should be analysed if the patient has not had a recent blood test. The patient is likely to be partially or fully blind and may be frightened in a hospital environment undergoing procedures. A quiet room should be chosen to perform procedures and the team should reassure the patient as much as possible. The patient should have an ocular ultrasound so that the surgeon is informed of any potential problems that they may come across in theatre or problems that would delay the surgery altogether. Potential problems that may be found are a lens rupture, retinal detachment or any other abnormal ocular findings, such as a mass. An ultrasound can be performed conscious and will only require a drop of local anaesthetic to keep the patient comfortable during this (Figure 3).

As discussed earlier in this article, an electroretinograph (ERG) should be performed on all patients to ensure the retina is in working order and there is a good prognosis for the eye regaining vision after phacoemulsification. The retina is composed of two types of photoreceptor cells: rods and cones. The rods function in dim light and the cones in bright light. A dog affected with PRA begins to have difficulty seeing in dim light and then gradually loses the ability to see in bright light (Lane, Cooper, Turner). It is useful to take a thorough history from the owners in the consultation to determine if vision is better during the day compared to night. The ERG is performed under the same general anaesthesia as the phacoemulsification surgery itself. The test must be performed under anaesthesia so that the patient is still because movement can interfere with results. The flash ERG test should be standardised (time for dark adaption, intensity and colour of light stimulus, presence of mydriasis, grounding, etc.) (Figure 4). The flash ERG in most cataract patients with PRA is usually negative or the b-wave is barely detectable. Dogs with cataracts and ERGs with low amplitudes present problems. Some of these dogs have early retinal degeneration that within 1–2 years will cause blindness (Gelatt & Gelatt, 2001).

If the ERG does not provide a promising trace then the clients should be contacted at this point to discuss their options. The owner may decide to still go ahead with surgery on at least one eye if they have bilateral cataracts, so that the dog can potentially have some vision and a better quality of life, even if for a short while.

Surgery preparation

Phacoemulsification cataract surgery is performed quite frequently in referral practice compared to smaller veterinary practices due to having the equipment and expertise available. Of course, as well as patient considerations, the veterinary surgeon must feel competent in carrying out this surgical procedure and may offer the client referral if not.

An hour prior to surgery the patient's eyes are prepared by administering tropicamide (Mydral, Mydriacyl) and flurbiprofen sodium (Ocufen) to dilate the pupil and reduce inflammation. The drops are alternated every 10–15 minutes.

Once the patient has been induced and is under general anaesthetic, the eyes are flushed with a 1:50 iodine–saline solution to ensure they are as clean as possible before an incision into the cornea is made. The fur surrounding the eyes does not need to be clipped; however, the fur should be short enough so that it does not get into the eyes during the surgery and during the post-operative healing period as well. The shorter the fur the easier it will be to maintain cleanliness.

Phacoemulsification

Two small incisions are made in the cornea to gain access to the lens, which sits in a capsule bag behind the iris. The eye is reinflated with a gel called a viscoelastic. A section of the capsule is then removed and the phacoemulsification can begin.

Phacoemulsification involves ultrasonic fragmentation and aspiration of the cataractous lens through a small incision. The phacoemulsification handpiece generates ultrasonic energy that fragments the lens material into small pieces that can be aspirated from the capsular bag and anterior chamber. The irrigation–aspiration handpiece does not generate ultrasonic energy and is used after nearly all of the cataractous material has been removed by the phacoemulsification handpiece to remove all possible lens fragments (Gelatt & Gelatt, 2001). After the lens fragments have been removed,



Figure 5. A dog's lens pre cataract surgery.



Figure 6. A dog's lens post cataract surgery.

an intraocular lens (IOL) is placed if possible. At the end of the surgery the two incisions in the cornea are closed with dissolving suture material.

An IOL can be placed to improve the pet's vision; however, pets can still see without lens implants. An eye that does not receive a lens implant will be farsighted, meaning that objects in the distance are in focus, but closer objects are blurry. An artificial lens restores vision to as close to normal as possible (Bluepearl, n.d.). Phacoemulsification is technically more difficult than traditional extracapsular extraction techniques, and the instrumentation is considerably more expensive. At this time, phacoemulsification yields the highest success rates for cataract extraction in dogs (Gelatt & Gelatt, 2001) (Figures 5 and 6).

Post-operative care

The patient must be fitted with a buster collar immediately before waking up from anaesthetic so that no self-trauma is

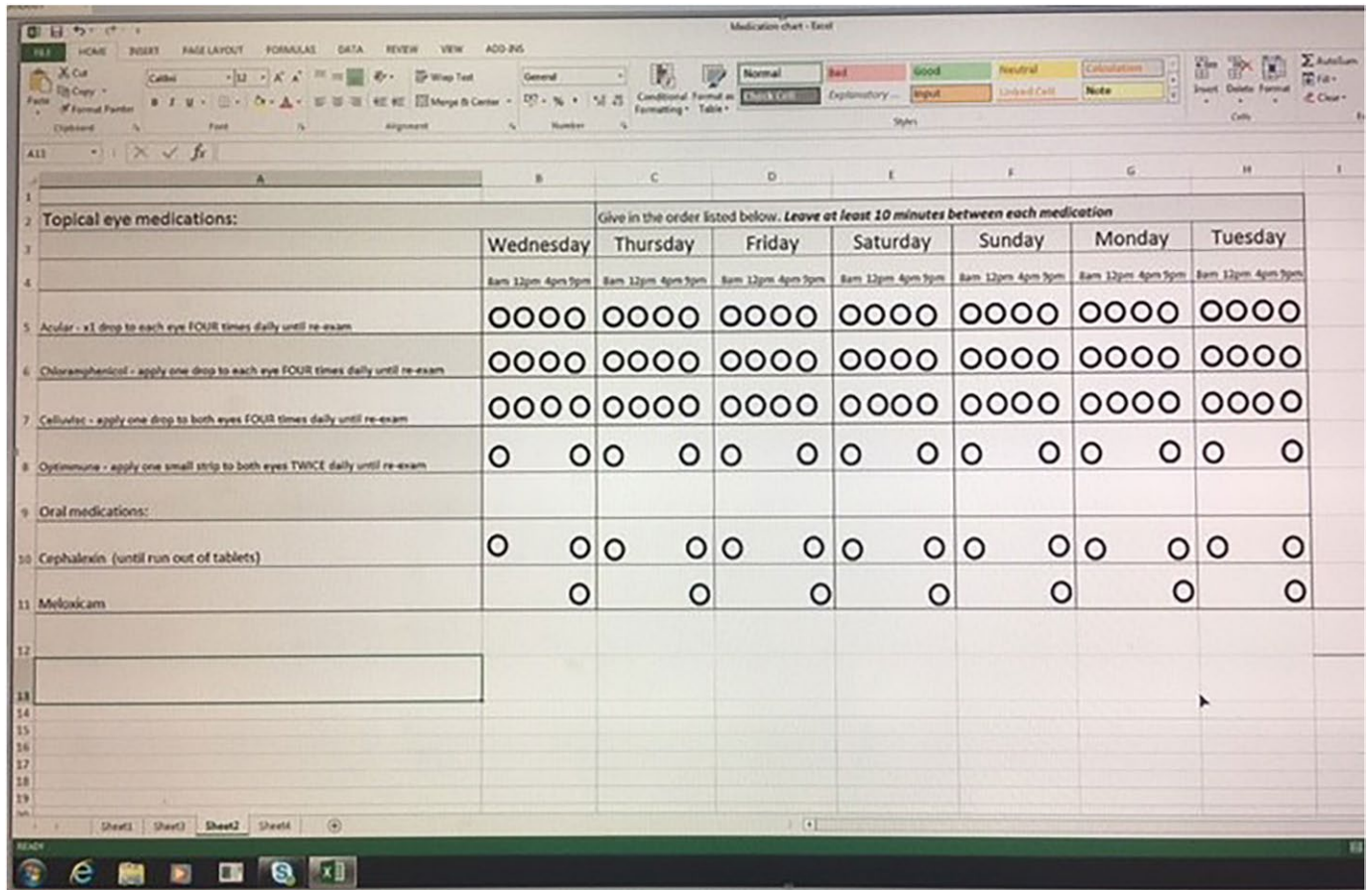


Figure 7. Example of a medication chart for owners to take home.

inflicted from rubbing the eyes. The team must also ensure they do not use neck leads, as this will increase the pressure around the neck and then within the eyes which will increase inflammation and not aid in the healing and success of the surgery. For the same reason, the patient must not be allowed to run and jump or be let off the lead to exercise. A harness is recommended and a reduction in exercise for at least 4 weeks to allow for healing time. To ensure clients comply with these instructions, it is important to explain the detrimental impacts allowing over-activity following surgery can have.

The patient will be discharged with eye medications which will include anti-inflammatories, tropicamide, lubricant and potentially ocular pressure medications if necessary. Tropicamide will dilate the pupil if needed, which acts as a topical pain relief. The patient will also require oral antibiotics and anti-inflammatories. The amount and frequency of medication can be very overwhelming, especially for clients that have never had to administer eye drops before. It can be extremely helpful to create a medication chart similar to a hospital kennel sheet that the owner can follow and tick off as they go (Figure 7). It is also useful to check if the owners are happy with administration methods and demonstrate the technique if not.

The team must also inform the owners what to expect when they are looking at the eye(s). The owner should be told it is not unusual for the patient to squint immediately after surgery and when in the bright light due to sensitivity; however, the patient should generally be comfortable when discharged and so the nurse/vet discharging the patient should ask the clients to contact the practice if the squinting becomes worse, if they are holding their eye(s) completely shut or if they suddenly become head shy. A small amount of mucous around the eyelids is expected and some sterile saline pods and swabs can be provided to gently clean this away. The owner should be monitoring for the development of any green/yellow or excessive discharge from the eye(s). It may be helpful to provide an email address that they can use to send pictures of the eye(s) to should they be concerned, then the veterinary team can advise appropriately.

Conclusion

In conclusion, cataract surgery can offer patients a much better quality of life if they are struggling to cope with a loss of vision and their demeanour has changed because of it. However, there are various factors to consider before commencing with the surgery and the necessary diagnostic imaging should be performed to minimise

complications. The owners play a large part in ensuring the success of the surgery and various methods can be used to assist them with aftercare, including medication charts, videos, demonstrations and written instructions.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

Bluepearl. (n.d.). Cataract Surgery. Retrieved from: <https://bluepearlvet.com/medical-articles/cataract-surgery-2/>

Bodewes, J. (2001). Cataracts. Retrieved from: www.petdiabetes.com/pecataracts.html

Peterson-Jones, S. & Crispin, S. (2002). *BSAVA manual of small animal ophthalmology*. Gloucester: British Small Animal Veterinary Association

Gelatt, K. & Gelatt, J. (2007). *Small animal ophthalmic surgery: Practical techniques for the veterinarian*. Oxford: Butterworth-Heinemann

Lane, D., Cooper, B., & Turner, L. (2001). *BSAVA Textbook of Veterinary Nursing*. Gloucester: BSAVA.

McCalla, T. (2001). Cataracts and cataract surgery in dogs. Retrieved from: <http://animaleyecare.net/diseases/cataract/>

MedicineNet. (2016). *Medical definition of cataract*. Retrieved from: <https://www.medicinenet.com/script/main/art.asp?articlekey=24423>

Turner, S. (2005). *Veterinary ophthalmology; A manual for nurses and technicians*. London: Butterworth Heinemann Elsevier.

Multiple Choice Questions

- A cataract caused by trauma to the eye is an example of a:
 - Primary cataract
 - Secondary cataract
- Which of the following is a test used to assess retinal function?
 - Electrocardiogram
 - Electroretinogram
 - Tonometry
 - Retinoscopy
- According to the article, how frequently is intraocular pressure typically measured overnight after cataract surgery?
 - Once
 - Every two hours
 - Every four hours
 - Every six hours
- Approximately what percentage of dogs develop cataracts within the first months of diabetes?
 - 10–30%
 - 40–60%
 - 50–70%
 - 80–100%
- Electroretinography must be performed under general anaesthetic.
 - True
 - False
- Managing owner expectations is important. Post-operatively, owners may not notice any significant change in their dog until:
 - 1–2 hours
 - 1–2 days
 - 1–2 weeks
 - 1–2 months
- Which of the following statements is **not** accurate?
 - Uveitis or glaucoma can cause cataracts
 - Posterior polar subcapsular cataracts are the most common form of inherited cataracts in dogs
 - Cataracts caused by diabetes are classified as secondary cataracts
 - Entropion enhances healing and reduces infection post cataract surgery
- Iridocyclitis is inflammation of the iris and the:
 - Conjunctiva
 - Ciliary body
 - Cornea
 - Choroid

For the answers to the MCQs, please go to: <http://www.bvna.org.uk/publications/veterinary-nursing-journal>



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