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# Nursing considerations for the ophthalmic rabbit patient

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**ABSTRACT:** The lagomorph eye is a very complex organ, composed of many structures which work together to permit sight, with specific adaptations to suit the prey species. Rabbits are often presented as first opinion patients with chronic eye problems; they are prone to a number of conditions and often show signs of ocular discharge, blepharospasm and peri-ocular swelling. RVNs are required to maintain a high level of knowledge and should research, review and implement current literature. This article aims to discuss the nursing considerations of the ophthalmic rabbit patient; exploring common conditions to show how such considerations can be implemented in general practice.

**Keywords:** Rabbit surgery; rabbit ocular conditions; nursing considerations; ophthalmic nursing

## Introduction

Rabbit ownership has dramatically increased and continues to do so; with an estimated UK population of 1 million pet rabbits (PDSA, 2018). Improvement in care, owner resources and education has increased rabbit life expectancy and owners expect the same level of care as canine and feline counterparts. Registered Veterinary Nurses (RVN) must maintain a high level of knowledge about all patients including rabbits and should research, review and implement current literature to meet the code of professional conduct (RCVS, 2019). Pet insurance for rabbits is now widely available and with the introduction of the 'Rabbit Friendly Vet Scheme', the standard of care has improved and the availability for referral has broadened treatment options.

Rabbits are often presented as first opinion patients with chronic eye problems. Nursing any ophthalmic patient can be challenging and RVNs should understand the risk factors involved with nursing a fragile eye. This article will explore the nursing care options for the ophthalmic rabbit patient, using common diseases to demonstrate how RVNs can optimise patient care.

## Main text

Rabbits are often presented as first opinion patients with chronic eye problems; they are prone to a number of conditions (Williams, 2012, Table 1) and often shown signs of watery ocular discharge, blepharospasm and swelling of the eyes and

eyelids (Williams, 2007). A commonly seen disease in rabbits is dacryocystitis which is an infection of the naso-lacrimal sac; often presented with a white discharge and ocular discomfort (Jakl, 2012; Williams, 2007). Ocular discharge can cause the fur at the lateral canthus to become matted and the eyelid to stick together; it is important that RVNs know how to clean ocular discharge effectively and are able to teach clients to provide the same level of care at home (Table 2). Ocular discharge should also be swabbed for culture and sensitivity as rabbits are prone to *Pasteurella multocida*, staphylococcal species and *E. coli*. It is also worth noting that dental problems can impede the naso-lacrimal duct and cause blockages; discussions with the client regarding dental care, diet and husbandry are necessary to reduce the risk of further problems. Rabbits are also prone to retrobulbar abscesses often associated with *Pasteurella multocida*; abscesses often form as an extension from dental disease (Jakl, 2012). Retrobulbar abscesses in rabbits often results in enucleation of the affected eye as surgical drainage is traumatic and difficult (Gelatt, Gilgerm, & Kern, 2013).

Rabbits, as a prey species, are very easily stressed via simple disruptions in routine and often disguise signs of pain and stress. Remarkably, stress is one of the most widely accepted factors which can cause post-operative complications (Mancinelli, 2015). When examining rabbits, it is important that RVN is able to assess their natural behaviour

**Table 1.** Common ophthalmic conditions of the rabbit.

Condition	Description
Dacrocystitis	Infection and inflammation of the nasolacrimal duct, usually associated with dental disease.
Conjunctivitis	Often referred to as 'pink eye', common isolated pathogens include <i>Pasteurella multocida</i> , <i>Staphylococcus</i> spp., <i>Treponema cuniculi</i> and <i>Mycoplasma</i> spp.
Corneal Ulceration	Corneal damage often associated with wounds sustained in fighting or from hay/grass.
Keratitis	Inflammation and pain of the cornea resulting in corneal oedema and cloudiness.
Epiphora	Excessive watering of the eye; often causes facial fold dermatitis.
Buphthalmos	Enlargement of the eyeball; often secondary to stress, retrobulbar abscess or glaucoma.
Myxomatosis	Disease of rabbits caused by the Myxoma virus, mucous membranes of the eyes become swollen and inflamed.
Retrobulbar abscesses	Infection occupying the space behind the eye; often secondary to dental disease.
Cataract	Cataractous changes of the lens, often due to common infective agent <i>E. cuniculi</i> , may lead to uveitis and ocular pain.
Glaucoma	Increased intra-ocular pressure, inherited as an autosomal recessive trait in New Zealand white rabbits

**Table 2.** Cleaning rabbits' eyes and applying eye drops.

Bathe eyes often to prevent build-up of discharge at the lateral canthus	
Wrap rabbit in towel and handle safely before cleaning	
Use saline or diluted povidone-iodine with lint-free gauze to gently bath around the eyes	
Apply eye drops from above, lifting the upper lid and place onto dorsal conjunctiva or cornea	
*Buster collars may be necessary to prevent ocular interference but the rabbit must be able to eat and drink and must not be stressed by the buster collar*	

and interpret signs of stress which may have a vast impact on the health and welfare of the patient (Mancinelli, 2016).

RVNs play a vital role in addressing stress as they often provide environments,

handling and monitor pain, consequently, the RVN must understand the pathophysiological effects of stress to know why implementing changes to these areas benefits the patient (Wiseman & Benato, 2016).

Notably, there is evidence that handling can cause stress and it is widely accepted that rabbits become stressed when handled by unfamiliar people and when handled above ground (Bradbury & Dickens, 2016). Kernot (2016) noted that the only time a wild rabbit would be lifted would be by a predator; veterinary professionals should perform clinical examinations in the carrier or on the floor. When lifting is unavoidable then the rabbit should be wrapped in a towel and the hind legs supported to transport the rabbit safely. To help reduce stress veterinary professionals should aim to handle rabbits as little as possible, procedures can be grouped together to reduce the time spent handling the rabbit; for example, Schirmer tear test, intra-ocular pressures and parameter monitoring can be performed together.

The lagomorph eye is a very complex and delicate organ, composed of many structures which work together to permit sight, with specific adaptations to suit the prey species (Figure 1). The major difference between canine and feline counterparts is the rabbit's visual field; the wider peripheral vision allows prey species to gain visual information from a relatively narrow band (Hughes, 1972). From a nursing perspective, rabbits should not be handled from above as they have a complete dorsal visual field, instead, rabbits should be approached close to ground level or at the level of the eyes. It is also important to note that the weight of a pet rabbit can affect their field of view, an obese rabbit will have a lack of panoramic visual field which may make them more frantic and aware of predators.

An ophthalmological examination on a rabbit with ocular discomfort requires a team approach from both the veterinary surgeon (VS) and the RVN. The rabbit should ideally be wrapped in towel or handled within its own carrier and the head should be lifted slightly and stabilised to allow an optimal position for examination. Scruffing should not be performed as it changes facial conformation and may increase intra-ocular pressure. On that note Tonic Immobility (TI) should also be avoided as the release of catecholamines may alter the menace and pupillary light reflex. Suitable pain relief prior to examination and the application of topical local anaesthetic ensures that the patient is comfortable prior to examination. If there is a risk of globe rupture, it may be more appropriate to perform an ocular examination under sedation or general anaesthesia.

During the ophthalmological examination, two procedures should be performed

routinely; tear production test and the measurement of intra-ocular pressure (Table 3). When handled correctly, most rabbits will tolerate Schirmer tear tests and intra-ocular pressure testing (Mancinelli, 2013). It is important to note that intra-ocular pressure can vary depending on the time of the day, seasonally and with the release of catecholamines; therefore, if intra-ocular pressure needs to be monitored, the same tonometer should be used at the same time of day for reliable results (Pereira, Bercht, Soares, da Mota & Pigatto, 2011). When examining intra-ocular structures, to achieve mydriasis a topical agent such as tropicamide is preferred as rabbits have circulating atropinase which will rapidly breakdown topical atropine (Williams, 2007).

Lagomorph Schirmer tear test results are a lower value than those compared to feline counterparts (Table 3). Though, rabbits only blink every five to six minutes their tear-film remains relatively stable and rabbits rarely suffer from exposure keratitis secondary to evaporation (Maggs, Miller, & Ofri, 2017). Tear film stability is achieved by the lagomorphs' four orbital glands; the lacrimal gland, and accessory lacrimal gland, superficial gland of the third eyelid and the harderian gland which is a deep gland of the third eyelid (Maggs et al., 2017). Retention of the tear film due to the lack of superior

lacrimal puncta also explains the lower Schirmer tear test result when compared to felines.

### Admission

At admission, rabbits should avoid waiting in reception areas and the time between admission and anaesthesia should be kept to a minimum to reduce stress. The period between admission and induction should be as stress-free as possible as changes in blood pressure and the release of catecholamines can increase intra-ocular pressure. RVNs should check the patient's normal behaviours and routines prior to surgery; the use of a nursing care plan or admission questionnaires allow for patient-focused and holistic care (Table 4). On that note, it is important to ask the owner how they feel about their pet rabbits' vision and if there have been any behaviour changes due to changes in vision.

### Surgical considerations

Inadequate induction is a known factor which can influence a rabbit's recovery time; rabbits are challenging to anaesthetise and rabbit anaesthesia has not progressed in the same way as canine and feline anaesthesia (Brodgelt, 2012). An appropriate pre-medication should be provided prior to any

ocular surgery; it is important to achieve a suitable plane of anaesthesia and meet the triad of anaesthesia in order to provide analgesia, prevent hyperaesthesia and reduce the risk of emergence delirium (Longley, 2009). On induction, suitable pre-medication can reduce the need for restraint which could reduce the pressure on the eyes. If a face-mask is used for induction or pre-oxygenation then it must not be placed over the eyes, as the pressure of the mask behind the globes can increase intra-ocular pressure. It is also important to note that flow-by oxygen can cause the eyes to become dry. A suitably sized mask should be used which snugly fits around the nose, if this is not possible then the eyes should be well lubricated prior to pre-oxygenation.

RVNS may face challenges when monitoring an ophthalmic rabbit patient; as there is limited access to the head with the presence of drapes. Jaw tone and palpebral reflexes or access to the head can be very limited (Presnail, 2016). Therefore, it is important to achieve a suitable depth of anaesthesia prior to draping the patient. It is also important to use appropriate monitoring equipment such as capnography, pulse oximetry and blood pressure machines (see images). Capnography is a vital tool as the airway management device is often not visible during ophthalmic surgery; the use of a supraglottic airway device or endotracheal tube with side-stream capnograph attachment is recommended over the use of a face mask. Communication between RVNs and the ophthalmologist is vital; the use of surgical safety checklists is recommended to improve safety and reduce the incidence of human error (Bradbrook, 2018). Ophthalmologist should discuss the use of topical agents prior to application with the RVN as they could affect the rabbit's parameters (Presnail, 2016).

As with every rabbit surgery, a quiet and calm recovery is necessary away from

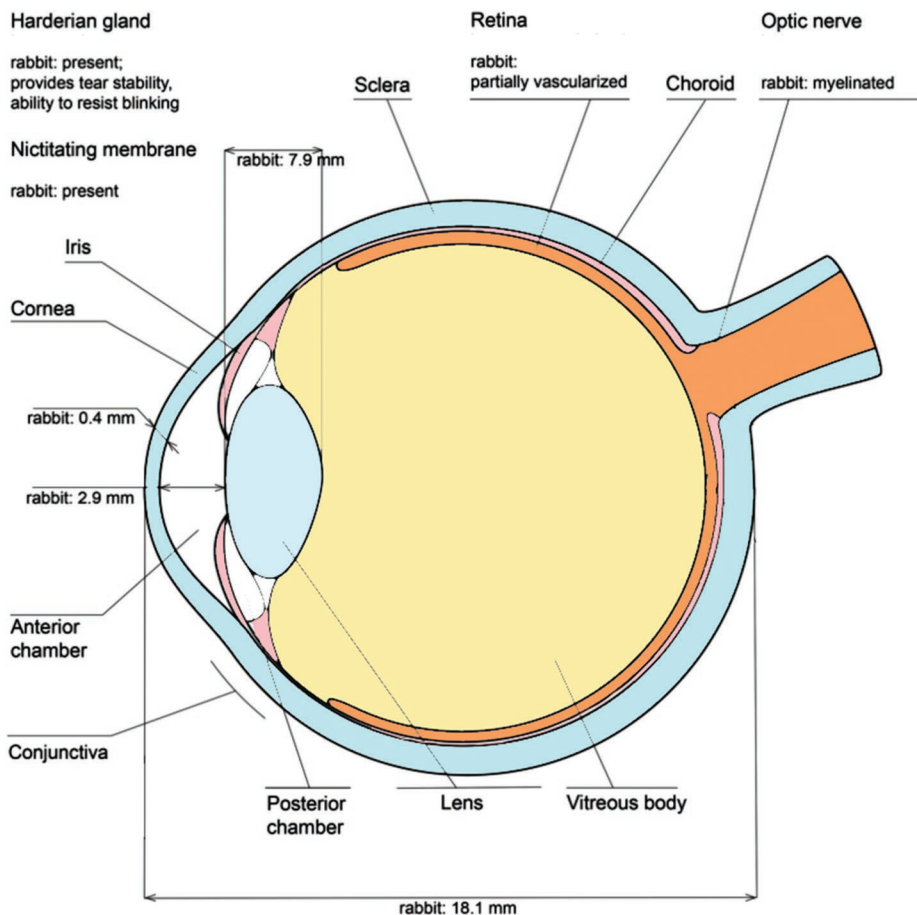


Figure 1. Rabbit eye anatomical diagram.

Table 3. Schirmer tear testing in rabbit.

Normal schirmer tear test result	5.3 + 2.9mm/min varying between breeds
Normal intra-ocular pressure result	17.5 +/- 3.5mmHg with diurnal and seasonal variation





Table 4. Admit questionnaire for rabbits.

ACTIVITY OF LIFE (AOL)	CURRENT ROUTINE	ACTUAL PROBLEM
1. Eat adequate amounts-Type of food/bowl? Any food allergies? Time of last meal		
2. Drink adequate amounts (bottle or bowl?)		
3. Urinate normally – Substrate/grass? Litter tray?		
4. Defecate normally		
5. Breathe normally (coughs/sneezing?)		
6. Maintain body temperature (indoor/outdoor?)		
7. Groom self (Do they get groomed?)		
8. Mobility – Normal exercise routine?		
9. Sleep/rest – where do they sleep? Hide box? Bedding?		
10. Express normal behaviour – what are they like at home?		
PRE-OPERATIVE CHECKS	BLOOD GLUCOSE READINGS	
T: P: R:	Time: Reading: mmol/L	
Heart Murmur? Y N Grade:	Time: Reading: mmol/L	
ASA: 1 2 3 4 5 E	Time: Reading: mmol/L	
Pre-operative check with VS? Y N Date:	Time: Reading: mmol/L	
Intraocular pressure: L: mmHg R: mmHg	Schirmer tear test: L: mm/min R: mm/min	
COMMENTS/BELONGINGS/CLIENT REQUESTS	CURRENT MEDICATION	

predator species is required to minimise the risk of post-operative stress and fatalities. Appropriate pain scoring (Keating, Thomas, Flecknell, & Leach, 2012) and pain relief will minimise the risk of ocular trauma and the use of a buster collar may need to be considered.

RVNs play a key role in infection control as they often take part in surgical skin preparation, when preparing for any ocular surgery, there are a number of nursing considerations to recognise due to the sensitivity and fragility of ocular structures. RVNs should wear appropriate personal protective equipment prior in surgical skin preparation to limit contamination of the surgical area, gloves will also protect the hands from constant use of chemicals.

Rabbits have very delicate skin and dense fur, minimal clipping or no clipping is preferred as clipper and skin irritation will likely cause more ocular discomfort and interference post-operatively. Sharp curved scissors coated in lubricating jelly can be used if necessary, however, it is important to copiously lubricate both eyes prior to any hair removal. Hair or debris that falls onto the lubricated ocular surface can then be flushed with saline solution (Adshead, 2012).

For surgical preparation, povidone-iodine is the preferred solution diluted 1:50 in sterile saline for use on the conjunctival sac and cornea (Peterson-Jones & Crispin, 2002). A higher concentration of 1:10 can be used on the external eyelid skin; lint-free swabs are preferred as linting versions or cotton wool can leave particles on the surgical site. Non-woven swabs are generally gentler on the

skin and can be folded by all four corners to create a smaller contact area which is easier to control near the eye surface. It is also important to ensure that the correct contact time and dilution is achieved for maximum antisepsis; both factors are often overlooked in busy veterinary surgery. In rabbits with globe rupture or penetrating injuries, saline or balanced salt solution should be used as povidone-iodine can damage intraocular structures should it enter the eye (Adshead, 2012).

When positioning the patient in theatre the rabbit should be placed on the correct side and the down facing non-surgical eye should be lubricated. The ophthalmologist will generally prefer to position the head with vacuum cushions to suit their needs. It may be necessary to place small rabbits in dorsal recumbency or use wedges to elevate the head and chest; the spine should be kept as parallel as possible to prevent injury or strains.

## Discharge and home care

Effective communication is a vital part of patient discharge; RVNs must be able to communicate information efficiently while engaging with the client and understanding their needs. General ocular nursing considerations need to be communicated with the owner; including demonstrations which allow the client to be involved and gives them an opportunity to ask questions about any aftercare (Table 2). Rabbits generally do not tolerate buster collars well and if one is used then the rabbit must be able to eat and drink without stress, as stress is often immunosuppressive and can cause gut

stasis. If topical mydriatic agents have been used the client must be made aware that the rabbit may be light sensitive and will benefit from being kept inside or in a shaded area for eight to twelve hours.

## Conclusion

With any ocular condition, it is important to follow a logical sequence to be able to identify and address unique nursing considerations; the use of nursing care plans and questionnaires allows for patient-specific and holistic care. General rabbit nursing considerations differ slightly from canine and feline counterparts due to a variety of reasons. An awareness of these factors and a basic understanding of the anatomical and physiological differences allows the RVN to provide a superior level of care. Rabbits are being seen more often in general and referral practice and clients will expect the same level of care as canine and feline patients; RVNs must maintain clinical knowledge on both the rabbit species and associated common ocular conditions.

## Disclosure statement

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

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