BASIC AND APPLIED NURSING RESEARCH JOURNAL
2023, Vol. 4, No. 2, 102 – 109
http://dx.doi.org/10.11594/banrj.04.02.06

Research Article

Enucleation of Bulbus Oculi in Domestic Cats Patients with Orbital Tumors

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Article history:
Submission January 2024
Revised January 2024
Accepted January 2024

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ABSTRACT

The eye is an essential organ for living things, as one of the five senses of the eye is very vulnerable to infectious or non-infectious diseases. The orbital tumor is one of the disorders in the cat's eye that can attack the eye muscles, nerves, and lacrimal glands. This study aims to diagnose and treat the enucleation of bulbus oculi in domestic cats and patients with orbital tumors. This activity was carried out at the Veterinary Practice "Drh. Juliadi Ramadhan, M.Si." Jl. Payakumbuh-Lintau No. 12 Regency 50 City, West Sumatra Province. The results showed that one of the treatments for orbital tumor cases can be done by enucleation of the oculi bulk. This operation uses a subconjunctival method to remove the eye, the nictitating membrane, and a little eyelid by minimizing the removal of extraocular muscle tissue. After surgery, intense treatment is carried out by maintaining the sanitation of the cage and administering anti-inflammatory drugs, antibiotics, and vitamins.

Keywords: *Cat, Enucleation, Eyes, Tumor*

Introduction

The eye is an essential organ for living things that is used to see. Living things can interact well with their environment by seeing. Not only in humans, but problems such as eye disease or eye disorders also often occur in animals. One of the animals that often experience eye disorders is the cat [1].

In cats' eyes, abnormalities are caused by many factors, such as bacterial infections, parasites, viruses, fungi, allergies, dust, injuries from fights, and tumors [2]. Abnormalities in the eyeball can be caused by local or systemic influences, starting unilaterally and then turning bilateral [3]. Some symptoms accompanying eye abnormalities are discharge, pain, lining, fogginess, hardness or softness, bulging or sinking, abnormal movement, and discoloration of the eye [1].

Orbital tumors invade the eye socket, damaging the soft tissues around the eye, such as eye muscles, nerves, and lacrimal glands.

How to cite:
Ramadhan, J., Nafis S., M., Gelagar, A. R., Aulia, U., Zukiaturrahmah, A., & Sukmawati, Y. (2023). Enucleation of Bulbus Oculi in Domestic Cats Patients with Orbital Tumors. *Basic and Applied Nursing Research Journal*, *4*(2), 102 – 109. doi: 10.11594/banrj.04.02.06

Orbital tumors are multifactorial diseases that develop over a long period with different stages of progression. Heredity is a crucial aspect associated with the pathological process of tumors. Viral infections such as papilloma, intraepithelial neoplasia of the conjunctiva, and UV radiation also cause tumors in certain parts of the eye [4].

Eye abnormalities can be treated using medication, but it is not uncommon for treatment to be performed by surgery [5]. One of the eye surgery techniques is enucleation, which is surgery on the eye by removing the eyeball and eye nerves [6]. Enucleation is used to remove blind and diseased eyes that can no longer be cured through medication, being the last resort to reduce pain from the eye, especially when the eye is blind and the eyeball is no longer helpful [7].

The cause of the lifting of the ball is The eye in this case because the cat has eyeball damage due to a secondary infection. Indications for enucleation are increased intraocular pressure produced by glaucoma, intraocular neoplasia with the potential to cause intraocular pain or metastasis, severe trauma produced by perforating wounds to the eye or damage to the lens, intraocular infection or endophthalmitis, phthisis bulbi, proptosis, and retrobulbar disease [8].

Materials and Methods

Animal preparation

The patient was admitted until she was eligible for surgery. An infusion that had been added with Neurobion was installed during the treatment. The patient was fed for 10 hours before undergoing surgery to empty the stomach and intestines so that vomiting would not occur under anesthesia.

Preparation of operating table and tools

Sterile operating instruments are placed on a sterile operating table and arranged in order.

Operator and cooperator preparation

Operators and cooperators must be sterile during the operation. Hands are washed thoroughly, from fingertips to elbows, with soap and brushed, then rinsed with clean running water until clean. Operators and cooperators use masks, gloves, and special operating clothes to minimize contamination during the operation.

Operation implementation

The operation method began with premedication using atropine sulfate as much as 0.10 ml and continued with anesthesia in the patient about 10 minutes after premedication. The anesthesia used was a combination of ketamine, as much as 0.13 ml, and xylazine, as much as 0.06 ml. After the patient was anesthetized, an endotracheal tube was inserted, and a maintenance dose of inhalation anesthesia was administered. The hair around the surgical area was shaved and cleaned, and then the surgical area was disinfected circularly from the inside out with 70% alcohol and 3% iodine tincture. After that, the patient was placed on the operating table in the lateral recumbency position, and enucleation surgery could begin.

The operation begins with an incision towards the canthus medianus using an electrocautery and then preparation with scissors. The tumor is pressed and removed, then suctioned with suction. The musculus around the eye is cut, and the optic nerve and blood vessels are clamped to the eye using a clamp, then ligated with a chromic catgut thread firmly and made sure it is not loose. Cut above the ligation; remove the optic nerve, blood vessels, and eyes; ensure no leakage in the ligation; then clean the remaining blood with sterile gauze and rinse using penstrep. Make a drainage channel with an IV hose towards the canthus medians, and sew with chromic catgut thread. Cut the superior and inferior palpebra ends, spray pen strep and iodine, and sew with supra mid thread in a simple interrupted pattern.

The surgical area was disinfected with 3% iodine tincture and lipoxin spray. The patient was given a ketorolac injection intramuscularly and then placed into a clean and dry cage.

Post-operative care

After the surgery, the patient is fitted with an Elizabeth collar on the neck. The suture area was routinely cleaned by gently pressing the surgical area to reduce fluid accumulation that can hinder healing. The patient was given antibiotic therapy to prevent postoperative

infection, anti-inflammatory medication to prevent inflammation, vitamins as supportive, and lipoxin spray to accelerate the healing of surgical wounds and not be infested with flies.

Result and Discussion

Case Report

Sinyalemen and Anamnesa

A cat named Yellow was a stray yellow domestic cat, male, five months old, weighing 1.3 kg, and was examined at Veterinary Practice "Drh. Juliadi Ramadhan, M.Si." Jl. Payakumbuh-Lintau No. 12 Regency 50 City, West Sumatra Province, with clinical symptoms of eye swelling.

Based on the examination results, there is a disturbance in the patient's eyes. The patient's right eye has swelling, periorbital alopecia, clear exudate with redness, the cornea of the right eye is foggy, in the right eye, there is a tumor in the nictitating membrane, and a tumor lump in the direction of the canthus medianus. Patients with orbital tumors are shown in Figure 1.

Figure 1. Yellow, a patient with an orbital tumor

Clinical symptoms of orbital tumors are deviated eyeballs, impaired eyeball movement, prominent nictitating membranes, alopecia around the orbits, lesions around the orbital cavity so that the eyeballs appear to bulge out, and increased pressure in the eye socket. This pressure can affect the optic nerve, impairing vision [9].

Some of the symptoms that accompany eye abnormalities are exudate in the eye, pain in the eye, lining over the eye, foggy eyes, hard or soft eyes, irritation of the eyelids, bulging or sinking eyes, abnormal eye movements, and discoloration of the eyes [1]. Protrusion of the eye is usually caused by glaucoma, tumors, and abscesses behind the eyeball. Immersion of the eyeball is caused by dehydration, weight loss, and tetanus. Red-eye discoloration indicates inflammation, and yellowish coloration indicates jaundice [2].

Supporting Examination

Blood test results in patient yellow showed normal leukocytes, lymphocytes, and granulocytes, while high monocytes (monocytopenia) and high platelets (thrombocytopenia). Erythrocytes, hemoglobin, and hematocrit were low, MCV was within normal limits, and MCHC and RDW were high. Yellow's blood test results are shown in Table 1.

Table 1. Yellow blood test results

Test	Result	Units	Reference Range	Level
WBC	17.4	$10^3/\mu L$	5.5 - 19.5	Normal
LYM	3.6	%	1.0 - 7.0	Normal
MONO	2.1	%	0.2 - 1.0	High
GRAN	11.7	%	2.8 - 13.0	Normal
HGB	6.8	g/dL	8.0 - 15.0	Low
HCT	17.2	%	25.0 - 45.0	Low
RBC	3.81	$10^6/\mu L$	5.0 - 11.0	Low
MCV	45.2	Fl	39.0 - 50.0	Normal
MCHC	39.5	g/dL	31.0 - 38.0	High
RDW	21.6	%	14.0 - 18.5	High
PLT	190	$10^3/\mu L$	200 – 500	Low

Monocytopenia is not clinically meaningful if other leukocyte cell counts are normal. Monocytosis is generally not meaningful but can be associated with chronic infection and chronic inflammation [10]. Low or decreased one of the erythrocyte parameters, which includes the number of erythrocytes, Hb concentration, and hematocrit value, in the blood circulation is called anemia. Anemia is a pathological condition due to decreased O2 transport capacity. Anemia is not a disease but a clinical symptom, usually appearing as a secondary response due to disease or impaired organ function. Anemia is one of dogs and cats' most common erythrocyte response disorders [11].

Eye pain is usually associated with excessive tear secretion and impaired vision, causing the animal to scratch the affected eye. Other conditions are characterized by protrusion of the nictitating membrane in response to pain. The layer above the eye's surface is usually an opaque color or white coating. Common causes of eye pain are corneal lesions, diseases of the deeper parts of the eye, and vision problems such as glaucoma and uveitis [7].

This surgery uses the subconjunctival method of removing the eyeball, nictitating membrane, and a small amount of eyelid to minimize the removal of extraocular muscle tissue. The subconjunctival method involves the removal of all lacrimal glands because any remaining glands will produce tears that cannot be channeled so that they accumulate and find other ways and then form a fistula connecting the eye and nasal cavities [12].

Operation Implementation

After entering the anesthesia stage, the patient was brought to the operating table, where he had previously been given a mat in the lateral recumbency position. The patient was fitted with an endotracheal tube and a maintenance dose of isoflurane inhalation anesthesia (Figure 2). According to Satria et al. [13], the use of ketamine-xylazine induction is done to facilitate handling (such as in the installation of an endotracheal tube), produce a deeper stage of anesthesia, and for animal welfare reasons.

Disinfection with alcohol and iodine tinctures occurs circularly. The operation begins with an incision towards the canthus medianus using an electrocautery and then preparation with scissors (Figure 3). Electrocautery is mainly used to reduce bleeding by burning tissue using electric frequency. The incision is done quickly to minimize the destructiveness of the surrounding tissue. In small animal eye surgery, electrocautery coagulates and hemostasis blood vessels [14].

The tumor is pressed and removed, then suctioned with suction (Figure 4). The musculus around the eye is cut, the optic nerve and the blood vessels to the eye are clamped, and the ligation with chromic thread is firm and not loose (Figures 5 and 6).

Figure 2. Insertion of an endotracheal tube and inhalation of anesthesia

Figure 3. Directional incision of the canthus medianus using an electrocautery

Figure 4. The tumor is pressed and removed, suctioned with suction.

Figure 5. The musculus around the eye is cut

Then, cut above the ligation, the optic nerve, blood vessels, and eyes are removed. Ensure there is no leakage in the ligation, then clean the remaining blood with sterile gauze rinse using penstrep (Figures 7, 8, and 9). Create a drainage channel with an infusion hose towards the canthus medianus and suture with chromic thread (Figure 10).

Figure 6. Optic nerve and blood vessels are ligated with chromic thread

Figure 7. Cutting of optic nerve and blood vessels

Figure 8. Penstrep is poured into the orbital cavity

Figure 9. Drainage channel

Slightly cut the superior and inferior palpebral ends, spray penstrep and iodine, and suture with supramid thread in a simple interrupted pattern (Figures 12 and 13)

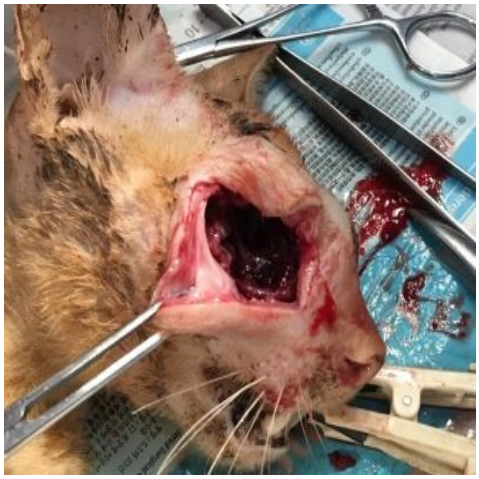

Figure 10. Cut the superior and inferior palpebral ends

Figure 11. Palpebra sutured with supra mid thread in a simple interrupted pattern

Postoperative Care

After the surgery, the patient is placed in a dry and clean cage. This is so that the wound healing process is not contaminated by bacteria and fungi that can hinder the healing process due to damp and dirty places. The patient is fitted with an Elizabeth collar on the neck. The suture area is routinely cleaned by gently pressing the surgical area to reduce fluid accumulation that can inhibit healing.

The therapy given was antibiotics in the form of amoxicillin tablets, with 12 hours per administration for five days. Vitamin C is a supportive therapy, and dexamethasone tablets are used as an anti-inflammatory, spanning 24 hours per administration for three days.

The drugs used affect the patient's recovery. Postoperatively given ketorolac injection, which is a non-narcotic analgesic class drug that has anti-inflammatory and analgesic effects, is absorbed quickly after intramuscular administration in plasma after 50 minutes of administration and has analgesic effects for 4-6 hours after injection. Ketorolac works by inhibiting the synthesis of prostaglandins, which are mediators that play a role in inflammation, pain, and fever and as a peripheral pain reliever.

Dexamethasone tablets are synthetic glucocorticoid-type steroids that can be used as anti-inflammatory, anti-allergic, immunosuppressant, and anti-shock, which is very strong. It penetrates the cell membrane so that a steroid-protein receptor complex will form. It alters DNA transcription and changes cell metabolism, reducing the inflammatory response. Dexamethasone has a long duration of action and low mineralocorticoid activity and is suitable for short-term high-dose therapy [15].

Amoxicillin is given as an antibiotic that works to prevent the formation of bacterial cell membranes so that all the genetic material inside breaks out and causes the bacteria to die. It treats infections caused by Gram-negative bacteria such as Haemophilus influenzae, Escherichia coli, Proteus mirabilis, and Salmonella spp. It can also treat infections caused by Gram-positive bacteria such as Streptococcus pneumonia, enterococci, non-penicillinase-producing staphylococci, and Listeria. Amoxicillin is indicated for respiratory tract infections, urinary tract infections, reproductive infections, sinusitis, bronchitis, pneumonia, dental abscesses, oral infections, skin infections, and also to prevent postoperative infections [16].

As supportive therapy, vitamin C is given, which plays a role in wound healing by increasing the immune system of postoperative patients and helping the collagen synthesis process. Vitamin C is required for the hydrolysis of proline and lysine into hydroxyproline, an important ingredient in collagen formation. Collagen is a protein compound that affects the integrity of cell structures in all connective tissues, such as cartilage, bone matrix, dental dentin, capillary membranes, skin, and tendons. Vitamin C plays a role in wound healing, bone fractures, bleeding under the skin, and bleeding gums [17].

Conclusion

After examination, the patient, named Yellow, was diagnosed with an orbital tumor. Based on the diagnosis, tumor removal and enucleation of the bulbus oculi in the patient's right eye with subconjunctival technique were performed to reduce pain in the patient's eye. The indication for enucleation is a chronic eye disorder that cannot be cured by local or systemic treatment.

Recommendation

Any injury to the cat's eye must be treated immediately, and given proper treatment, the wound does not cause infection or trauma and results in bulbus oculi prolapse. Take note of the cleanliness of animals and the environment to avoid further infection, myiasis, and other complications. It is necessary to carry out a health check, administer worm medicine, and vaccinate when rescuing a rescued cat to make detecting its health status easier.

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