

Management of Enucleation Surgery in Anggora Cat

Ahmad Syarifuddin^{1*}, Dedi Damhuri², Jessica Anggun Safitri³, Sarwo Edy Wibowo⁴

^{1*, 2, 3, 4} Departement of Animal Science, Universitas Jambi, Jambi

email: ahmadsyarifuddin@unjia.ac.id

Received : 26 Oct 2024

Accepted : 31 Oct 2024

Published : 20 Nov 2024

Abstract

Enucleation is a procedure for removing the eye in cats due to pathological conditions that cannot be treated with medical therapy, such as uncontrolled glaucoma or intraocular tumors. Prolapse of the bulbus oculi in cats is generally caused by glaucoma (increased intraocular pressure), bacterial or viral infections, trauma from being hit by a vehicle, scratches or fights with other animals, and eye tumors. The subject of this case was a male cat named Chiko, approximately 1 year old, weighing 3 kg, who was brought to the She Wee Veterinary Clinic in Palembang with a complaint of a protruding eye. Based on the anamnesis, physical examination, and clinical symptoms, Chiko was diagnosed with bulbus oculi prolapse and underwent medical treatment in the form of a enucleation surgery. The treatment administered included antibiotics, vitamins, analgesics, and ointments. The use of an Elizabethan collar was also recommended to prevent the wound from being scratched. Recovery showed good wound healing within approximately 7 days without serious complications. It was concluded that the enucleation procedure performed on Chiko, using the transpalpebral technique, had a fausta prognosis.

Keywords: Prolapse, Bulbus Oculi, Enucleation, Eye and Cat.

INTRODUCTION

Enucleation surgery is a relatively common procedure in veterinary ophthalmology, particularly for cats, where it involves the removal of one or both eyes. This surgery is usually performed when the affected eye has sustained severe damage or suffers from irreversible conditions that compromise the animal's health, comfort, or quality of life. Several pathological conditions can necessitate enucleation in cats, including physical trauma, which is often caused by accidents, fights, or environmental hazards, leading to irreparable structural damage to the eye. In addition to trauma, chronic infections such as uveitis, a persistent inflammation of the uveal tract, can cause severe pain and, if left untreated, irreversible vision loss, making enucleation the most viable option in advanced cases (Hollingsworth *et al.*, 2017).

Glaucoma, another frequent cause of enucleation, arises when the intraocular pressure becomes unmanageable and causes optic nerve damage, resulting in permanent blindness. In cases where glaucoma remains unresponsive to medical and surgical treatments, enucleation may be considered to alleviate the cat's discomfort (Spiess, 2018).

Intraocular neoplasms, such as primary or metastatic eye tumors, can also necessitate the removal of the eye to prevent the spread of cancer or reduce pain. These neoplasms, while not common, pose a serious threat to both the ocular and overall health of the cat, making surgery essential for their management in certain cases (Pereira *et al.*, 2020).

In general, enucleation is regarded as a last-resort intervention, usually considered only when conservative treatments such as medications or less invasive surgical options fail to provide satisfactory outcomes, or when the eye is no longer visually functional and has become a source of pain or infection. While the procedure removes vision in the affected eye,

most cats adapt remarkably well post-surgery, relying on their remaining vision and other senses to navigate their environment effectively (Hollingsworth *et al.*, 2017).

Enucleation, from a technical standpoint, involves the complete removal of the globe (eyeball) along with surrounding tissues, including the extraocular muscles, conjunctiva, and a portion of the optic nerve. This procedure is meticulous and requires careful dissection to ensure that all affected tissues are fully excised while preserving as much healthy surrounding tissue as possible. The surgery is typically performed under general anesthesia, ensuring the cat remains immobile and pain-free during the operation, which is crucial for preventing stress or injury during the procedure (Slatter, 2008).

In terms of surgical approach, the incision is generally made around the conjunctiva, allowing access to the globe and the underlying structures. The extraocular muscles are carefully detached from the sclera to release the eyeball, while great care is taken when severing the optic nerve, as cutting it too close to the brain could lead to complications such as damage to nearby neurological structures or hemorrhage. Some surgeons opt to leave a small portion of the optic nerve intact to reduce this risk. Moreover, once the globe has been removed, the surgeon must ensure proper hemostasis, as uncontrolled bleeding can increase the risk of postoperative complications, such as hematoma formation or infection (Hendrix, 2013).

After the globe is removed, the eye socket is typically sutured closed, often with the placement of a temporary drain to allow any excess fluids to escape, thereby reducing the likelihood of abscess formation or infection. The area is also closely monitored for postoperative complications, which can include infection, excessive bleeding, abscesses, or even orbital cellulitis, a potentially serious infection of the tissues surrounding the eye. Infections are managed with antibiotics, while abscesses may require drainage to resolve. Strict postoperative care, such as administering analgesics, antibiotics, and ensuring the surgical site remains clean, is essential to facilitate healing and minimize the risk of these complications (Rha, 2019).

Enucleation is typically well-tolerated in cats, with most animals recovering fully within a few weeks. However, the success of the surgery largely depends on the skill of the surgeon and the management of the immediate postoperative period. Long-term outcomes are generally favorable, with minimal impact on the cat's overall quality of life, as most cats adapt quickly to the loss of one eye and rely on their remaining senses to compensate (Slatter, 2008).

Writing an article on the management of enucleation surgery in Anggora cats is important due to the unique anatomical and physiological traits of this breed, which may influence surgical approaches, anesthesia protocols, and post-operative care requirements. Enucleation, or the surgical removal of an eye, is sometimes necessary for conditions such as severe trauma, chronic infection, or tumors. By focusing specifically on Angora cats, the article can provide veterinarians and pet owners with targeted insights into the best practices, potential complications, and specific needs of this breed, ultimately improving outcomes and the quality of life for affected cats.

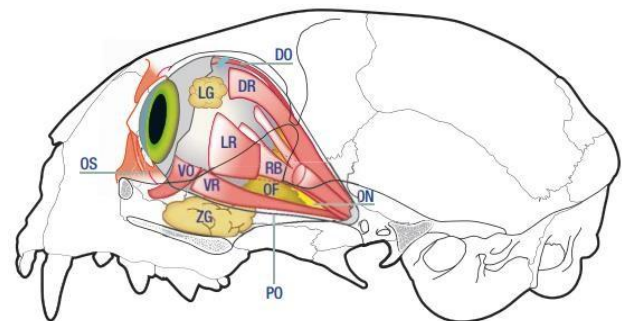


Figure 1. Structure Of Cat's Eye (Mitchell & Oliver, 2015)

MATERIALS AND METHODS

In the treatment of Prolapsed Bulbus Oculi in cats, the subject typically presents with the prolapse of the eyeball, a condition that requires urgent medical intervention to prevent permanent vision loss and reduce the risk of infection or further damage. The procedure involves both medical and surgical components, necessitating a variety of specialized equipment and materials. Essential equipment includes a tourniquet to manage blood flow, a protective collar (Elizabethan collar) to prevent the cat from self-injury during

recovery, and a stethoscope and thermometer to monitor the cat's vital signs before and after the procedure. Clippers are used to remove fur around the surgical site, and towel clamps are employed to secure drapes around the area to maintain a sterile environment. The surgical instruments include anatomical and surgical forceps, scalpel blades for incisions, artery clamps for hemostasis, and a variety of scissors (blunt-sharp, blunt-blunt, sharp-sharp) to cut tissues with precision. A needle holder is necessary for suturing, while 1ml and 3ml syringes are used for administering medications or irrigating the eye. The procedure is conducted under the focused light of a surgical lamp, with the cat restrained securely on an operating table using a restraint rope to ensure minimal movement (Gelatt *et al.*, 2013).

The materials used during surgery are vital for maintaining sterility and ensuring smooth surgical execution. Sterile gloves and disposable masks protect both the patient and the medical team from contamination. Suturing is performed using 3/0 vicryl sutures, a type of absorbable suture, and 3/0 silk sutures, which are non-absorbable and used for skin closures. Sterile tampons and gauze pads are necessary for absorbing blood and fluids, while underpads protect the operating surface. Pre-surgical antiseptic measures include swabbing the area with 70% alcohol and povidone-iodine (Betadine) to reduce the risk of infection (Bistner *et al.*, 2010).

Medications play a critical role in the success of the procedure. Anesthesia, typically ketamine, is used to induce a state of unconsciousness and analgesia, ensuring the cat feels no pain during the surgery. Ceftriaxone, a broad-spectrum antibiotic, is administered to prevent infection postoperatively. Tramadol is given as an analgesic to manage pain during the recovery period. Hematodin[®], a vitamin supplement, may be provided to support healing and tissue repair, while Bioplacenton[®], a topical medication, is applied to the eye post-surgery to promote healing and prevent infection. These medications, when used in conjunction with proper surgical techniques and aftercare, significantly increase the chances of a successful outcome, allowing the cat to recover comfortably with minimal complications (Panda *et al.*, 2015).

RESULT

Chiko, a male cat weighing 3 kg, was brought to the She Wee Veterinary Clinic in Palembang. Based on the anamnesis with the owner, it was reported that the cat had a protruding eye. The incident began when the cat disappeared for several days and was later found with an abnormal eye condition. The owner assumed that the cat had been hit by a vehicle, causing trauma to the eyeball. During this time, the owner did not provide any treatment, and the cat was only given dry food and unlimited water.

Based on the physical examination conducted through inspection, the patient's eye was found to have prolapsed with the presence of hyphema. Overall, the patient appeared active and responsive, with good appetite and hydration. During palpation, the patient's body temperature was within the normal range at 37.9°C, with no swelling detected. The pulse rate was recorded as normal at 115 beats per minute, and the respiratory rate was within the normal range at 32 breaths per minute. Percussion examination was performed by tapping the chest area with fingers, producing a relatively resonant sound. Auscultation revealed the "lub" and "dup" sounds, indicating normal heart function. The traditional heart sound is described as "lub-dup," which can be heard through a stethoscope. The normal values for temperature, pulse, and respiration in cats are: Temperature 37.5-39.2°C, pulse rate 105-210 beats per minute, and respiratory rate 24-38 breaths per minute, with a heart rate range of 135-205 beats per minute (Morgan, 2008).

Postoperative care following enucleation in cats involves several critical steps aimed at ensuring optimal recovery and preventing both immediate and long-term complications. Proper care begins immediately after surgery, with the administration of analgesic medications, as prescribed by the veterinarian, to manage pain and discomfort effectively. Common analgesics include non-steroidal anti-inflammatory drugs (NSAIDs) or opioids, which help alleviate pain while minimizing inflammation. Depending on the severity of the procedure and the individual cat's response, the veterinarian may also prescribe additional pain-relief measures, such as gabapentin, to control nerve-related pain. Alongside pain management, antibiotics are

typically provided to reduce the risk of postoperative infections at the surgical site. These antibiotics may be given orally, topically, or via injection, depending on the veterinarian's preferences and the cat's health status. Preventing infection is a key priority since cats can be prone to bacterial contamination at the surgical site, particularly in the first few days following the procedure (Hendrix, 2013).

The surgical area should be monitored closely and cleaned regularly according to the veterinarian's instructions. Cleaning the area involves gently wiping it with sterile saline or an antiseptic solution, such as diluted povidone-iodine, to prevent bacterial buildup. Special attention should be paid to keeping the stitches clean and dry, as moisture or debris can increase the risk of infection and delay healing. Signs of infection to watch for include redness, swelling, heat, discharge, or foul odor from the incision site. Owners should be diligent in contacting their veterinarian if any of these symptoms arise, as early intervention is crucial for preventing more serious complications such as abscess formation or wound dehiscence (the reopening of the wound) (Gelatt *et al.*, 2013).

To prevent the cat from scratching, licking, or otherwise disturbing the surgical site, it is essential to fit an Elizabethan collar (E-collar) during the recovery period. Cats naturally groom themselves, and their instinct to lick or scratch the area could lead to wound reopening, infection, or the removal of stitches. An E-collar acts as a barrier, allowing the wound to heal undisturbed. In some cases, a soft collar may be used for cats that are particularly sensitive to the standard plastic E-collar, as it provides a more comfortable alternative without compromising protection. Regular follow-up visits with the veterinarian are crucial to check the wound's condition, remove stitches, and ensure that the healing process is progressing appropriately. These visits also provide an opportunity for the veterinarian to monitor for any potential complications, such as tissue granulation or infection, which may require additional treatment (Hollingsworth *et al.*, 2017).

Another important aspect of postoperative care is monitoring the cat's overall health and behavior, particularly its appetite and hydration levels. Cats recovering

from surgery may experience a reduced appetite due to discomfort or medication side effects, which can lead to dehydration or weight loss. Owners should ensure that the cat continues to eat and drink adequately, and if a significant decrease in appetite occurs, they should contact their veterinarian for guidance. Appetite stimulants, alternative food options, or even subcutaneous fluid therapy may be necessary to maintain the cat's nutritional status during recovery. Providing a quiet, stress-free environment can also help the cat feel more comfortable and encourage eating and drinking (Barrs *et al.*, 2015).

Finally, follow-up examinations with the veterinarian are essential for monitoring the healing process and ensuring that the stitches are removed at the appropriate time, typically within 10 to 14 days. These check-ups allow the veterinarian to detect any late-developing complications, such as infection or scarring, and provide necessary treatments. Proper postoperative care, including pain management, wound care, activity restrictions, and close communication with the veterinarian, is critical to ensuring a smooth recovery and preventing further complications. (Slatter, 2008).

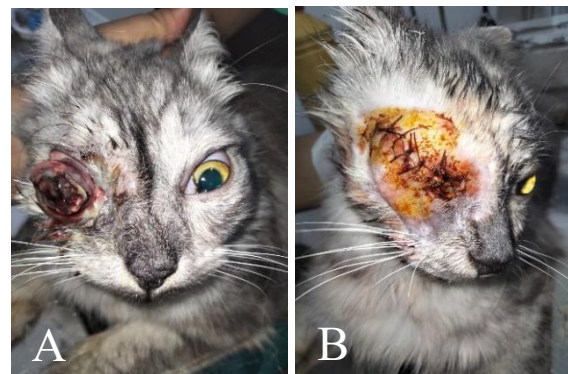


Figure 2. Condition of the cat before (A) and after (B) surgery.

The surgical process began with the induction of anesthesia, a crucial step to ensure the cat remains pain-free and immobile during the procedure. Anesthesia was initiated with premedication using acepromazine at a dose of 0.01 mg/kg of body weight, which acts as a tranquilizer to calm the animal and lower its stress levels. Ten minutes after premedication, ketamine HCl was administered at a dose of 20 mg/kg body weight to achieve deeper sedation.

Ketamine, a dissociative anesthetic, is frequently used in veterinary practice due to its strong sedative and analgesic properties, which ensure that the cat is fully anesthetized before surgery. Once the cat was stabilized under anesthesia, the eye area was shaved, ensuring a sterile field for surgery. An intravenous infusion with Ringer's lactate solution was initiated to maintain hydration and blood pressure during the operation. The surgical site was then covered with a sterile drape to maintain asepsis throughout the procedure (García-López *et al.*, 2009).

The enucleation procedure was performed using the transpalpebral technique, which involves suturing the eyelids closed and applying clamps to secure the area before removing the eye as a single, closed unit. This technique is particularly beneficial in cases where infection or neoplasia is present because it prevents any potential contamination of the orbital contents by the diseased eye structures. Blunt dissection was carefully carried out using Metzenbaum scissors to detach the extraocular muscles, including the superior rectus, inferior rectus, medial rectus, and lateral rectus muscles, which are responsible for eye movement. This dissection allows for safe mobilization of the globe while minimizing trauma to surrounding tissues. Once these muscles were freed, the eyeball was retracted gently to expose critical structures such as the retractor bulbi muscle, central retinal artery, central retinal vein, and optic nerve, all of which were ligated using absorbable sutures. Ligating these structures is essential to control bleeding, prevent reflux of blood into the orbit, and avoid cerebrospinal fluid (CSF) leakage, which could occur if the optic nerve is not properly tied off (Betbeze *et al.*, 2021).

The eyeball was removed by cutting between two clamps placed on the optic nerve and associated vessels, ensuring minimal blood loss during the procedure. After the enucleation, antibiotics were administered to prevent postoperative infections, which are a common concern in any invasive surgery. The extraocular muscles and subcutaneous layers were then sutured using a simple continuous stitch pattern to provide secure closure and promote proper healing. The skin incision was

treated with povidone-iodine, an effective antiseptic that reduces the risk of infection, and the surgical area was covered with sterile gauze and secured with Hepafix, a type of adhesive dressing that holds the gauze in place without irritating the skin (Murata *et al.*, 2010).

Enucleation is the most common orbital surgical procedure performed by veterinarians, particularly in cases of blindness, painful eyes, severe ocular trauma, or intraocular tumors. There are three main enucleation techniques: subconjunctival, lateral, and transpalpebral. Each has specific indications depending on the underlying pathology and desired outcome. The subconjunctival approach is often used when it is important to preserve as much orbital soft tissue as possible to prevent postoperative complications such as orbital depression. In contrast, the lateral approach involves partial excision of the eyelid to provide better surgical exposure and is typically employed in cases of severe trauma. The transpalpebral approach, which was used in this case, is preferred for situations involving corneal ulcers, ocular infections, or neoplasia because it allows for the removal of the eye, nictitating membrane, and conjunctiva as a single closed unit, preventing contamination of the orbit with potentially infected or cancerous tissue (García-López *et al.*, 2009).

The transpalpebral approach was selected in this clinical case due to its advantages in providing excellent visibility and access to the eyeball and surrounding extraocular muscles. This technique is particularly useful for enucleations where there is a risk of infection spreading from the eye to surrounding tissues. The optic nerve and ciliary vessels were securely tied off with ligatures to reduce bleeding and to seal off the nerve from the central nervous system, thus preventing blood reflux or cerebrospinal fluid (CSF) leakage, which is a serious complication that could result from improper handling of the optic nerve. Care was taken to avoid excessive traction on the optic nerve, as this could lead to damage to the contralateral eye and result in postoperative complications, such as pupil dilation or loss of vision in the remaining eye (Hiebert *et al.*, 2023).

In conclusion, the transpalpebral method is highly recommended for enucleation in

patients with conditions such as corneal ulcers, ocular infections, or intraocular neoplasms. This technique minimizes the risk of orbital contamination and provides excellent surgical access, making it a preferred choice in complex or infectious cases. Postoperative care, including the administration of antibiotics and careful monitoring for complications, is essential for ensuring a successful outcome and smooth recovery (Murata *et al.*, 2010)

CONCLUSION

Based on the anamnesis, physical examination, and clinical symptoms, the cat, Chiko, was diagnosed with a prolapsed eyeball accompanied by a corneal ulcer resulting from secondary trauma caused by keratoconjunctivitis sicca. The treatment provided included enucleation surgery and the administration of antibiotics. The cat underwent post-operative care for seven days and showed good wound healing progress. Recovery showed good wound healing without serious complications.

REFERENSI

- Barrs, V. R., Beatty, J. A., & Jones, D. (2015). Feline postoperative hydration and appetite management after major surgery. *Veterinary Practice*, 29(2), 85-93.
- Betbeze, C. M., Dray, S. M., & Fontenot, R. (2021). Subconjunctival enucleation with orbital implant placement in standing horses: 20 cases (2014-2017). *Journal of the American Veterinary Medical Association*, 258(6), 661-667.
- Bistner, S., Rubin, L. F., & Saunders, L. Z. (2010). *Ophthalmic Pathology of Animals: An Atlas and Reference Book*. S. Karger Publishers.
- García-López, J., Poulin, A., Doran, R., & Quinteros, D. D. (2009). Transpalpebral enucleation using a chain écraseur. *Equine Veterinary Education*, 21, 603-607.
- Gelatt, K. N., Gilger, B. C., & Kern, T. J. (2013). *Veterinary Ophthalmology* (5th ed., Two volumes). Wiley-Blackwell.
- Hendrix, D. V. M. (2013). Feline enucleation: A guide to technique and postoperative complications. *Topics in Companion Animal Medicine*, 28(3), 82-86.
- Hiebert, K., Mans, C., & Eaton, S. (2023). Subconjunctival enucleation with or without third eyelid removal may present a viable enucleation technique in rabbits: 18 cases (2014-2022). *Journal of the American Veterinary Medical Association*.
- Hollingsworth, S. R., Varga, M., & Scurrall, E. (2017). Neoplasia and complications associated with enucleation in cats: A retrospective review of 55 cases. *Journal of Feline Medicine and Surgery*, 19(11), 16.
- Mitchell, N & Oliver, J. 2015. *Feline Ophthalmology*. Servet.
- Murata, D., Ide, T., Yabuki, A., Miyoshi, N., Hatazoe, T., Fujiki, M., & Misumi, K. (2010). An equine case of squamous cell carcinoma treated with transpalpebral enucleation. *Journal of the Japan Veterinary Medical Association*, 63, 931-934.
- Panda, S. S., Rao, M. P., & Roy, M. (2015). Randomized clinical trial on opioid-free injectable anesthesia in kittens undergoing surgery. *Journal of Feline Medicine and Surgery*, 17(5), 234-242.
- Pereira, F. Q., Carvalho, A., & Figueira, L. (2020). Feline intraocular tumors: Metastasis to the eye in animals. *Open Access Journal of Veterinary Medicine*, 8(3), 120-130.
- Rha, S. M. (2019). Clinical study of postoperative complications in enucleation and amputation: Majority outcomes. *Veterinary Clinical Surgery Journal*, 17(4), 123-132.
- Slatter, D. (2008). *Fundamentals of Veterinary Ophthalmology* (4th ed.). Saunders.
- Spiess, B. M. (2018). Clinical practice in the treatment of feline glaucoma. *Journal of Feline Medicine and Surgery*, 20(1), 33-42.