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CASE REPORT: TREATMENT OF RIGHT EYEBALL PROLAPSE IN A DOMESTIC KITTEN USING TRANSCONJUNCTIVAL ENUCLEATION APPROACH

Laporan Kasus: Penanganan Prolapsus *Bulbus Oculi Dextra* pada Seekor Anak Kucing Domestik Melalui Pendekatan Enukleasi Transkonjungtiva

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Abstract

Prolapse of the eyeball refers to the protrusion of the globe from the orbital cavity and may be caused by various factors, including infection, increased intraocular pressure, trauma, and abnormalities of the extraocular muscles. A three-month-old female domestic cat weighing 0.9 kg presented with prolapse of the right eyeball. The cat was treated surgically using a transconjunctival enucleation approach. This procedure was selected because the ocular abnormalities could not be resolved through medical therapy. Prior to surgery, premedication with atropine sulphate (0.03 mg/kg BW) was administered subcutaneously. Fifteen minutes later, anesthesia was induced and maintained by intramuscular injection of a combination of ketamine (11 mg/kg BW) and xylazine (2 mg/kg BW). Postoperatively, the animal received antibiotic therapy with cefotaxime (20 mg/kg BW, q12h, intramuscularly) and anti-inflammatory treatment with meloxicam (0.2 mg/kg BW, q24h, subcutaneously). This was followed by oral administration of cefixime (10 mg/kg BW, q12h) and meloxicam (0.1 mg/kg BW, q24h) for five days, along with supportive therapy using Fufang E'jiao Jiang® (0.5 mL/kg BW, q24h, per oral). Based on wound observations up to the seventh postoperative day, the surgical incision had not completely dried; however, the wound healing process progressed well, and no signs of infection were observed at the surgical site.

Keywords: eyeball prolapse, local cat, transconjunctiva enucleation

Abstrak

Prolapsus *bulbus oculi* atau keluarnya bola mata dari *cavum orbita* diakibatkan oleh berberapa faktor antara lain adanya infeksi, tekanan bola mata yang tinggi, serta trauma dan kelainan pada otot mata. Seekor kucing ras domestik berumur tiga bulan dengan jenis kelamin betina dan bobot badan 0,9 kg mengalami prolaps *bulbus oculi dextra*. Kucing ini ditangani dengan tindakan pembedahan yaitu enukleasi pendekatan transkonjungtiva. Enukleasi merupakan

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tindakan pembedahan untuk mengangkat keseluruhan bola mata. Dasar dilakukannya tindakan ini adalah karena kelainan mata tidak bisa disembuhkan oleh terapi obat-obatan. Sebelum dilakukan pembedahan diberikan premedikasi atropine sulfate (0,03 mg/kg BB) secara subkutan, lalu 15 menit kemudian induksi dan pemeliharaan anestesi menggunakan kombinasi ketamin (11 mg/kg BB) dan xylazin (2 mg/kg BB) secara intramuskular. Pasca operasi hewan diberikan terapi antibiotik cefotaxime 20 mg/kg BB/q12h secara intramuskular dan antiinflamasi meloxicam 0,2 mg/ kg BB /q24h secara subkutan, dilanjutkan dengan pemberian antibiotik cefixime 10 mg/ kg BB/q12h secara per oral selama tujuh hari dan meloxicam 0,1 mg/kg BB/q24h secara per oral selama lima hari dan terapi suportif (Fufang E'jiao Jiang®) 0,5 mL/kg BB/q24h per oral. Berdasarkan hasil pengamatan luka hingga hari ketujuh, luka insisi masih belum mengering sempurna tapi proses penyembuhan luka berjalan baik dan tanpa disertai infeksi pada daerah luka.

Kata kunci: enukleasi transkonjungtiva, kucing domestik, prolapsus *bulbus oculi*,

INTRODUCTION

The eye is a vital and highly sensitive organ in the body of living beings, including cats. Prolapse of the globe (prolapsus *bulbi oculi*), defined as the displacement of the eyeball from the orbital cavity (*cavum orbita*), is one of the ocular abnormalities that may occur in cats. This condition can be caused by several factors, including infection, trauma, tumors, and abnormalities of the extraocular muscles, which may become lax and unable to adequately support the globe. Such damage can impair the normal function of the eye as an organ of vision. The prognosis of globe prolapse is considered favorable when vision is still present, the degree of proptosis is mild, the duration is short, hyphema is absent, extraocular muscle damage is minimal, and funduscopic examination findings are normal (Fossum, 2019).

Enucleation is a surgical procedure involving the complete removal of the eyeball, with or without the conjunctiva. This procedure includes removal of the globe along with a portion of the anterior optic nerve, while attempting to preserve the conjunctiva, Tenon's capsule, and the extraocular muscles. Indications for enucleation include increased intraocular pressure due to glaucoma unresponsive to medical treatment, intraocular neoplasia associated with ocular pain, severe trauma resulting from penetrating ocular injuries or lens damage, intraocular infection or endophthalmitis, phthisis bulbi, proptosis, and retrobulbar diseases (Schulz & Anderson, 2010). Enucleation can be performed using two surgical approaches, namely the transconjunctival approach and the transpalpebral approach (Al-Asadi, 2012).

RESEARCH METHODS

Signalment and Anamnesis

A three-month-old female domestic shorthair kitten with a calico coat named Kitty, weighing 0.9 kg, was presented in this case. According to the owner, the kitten had been rescued at approximately two months of age and already showed a protrusion of the right eye at the time of rescue (Figure 1). No treatment had been administered prior to presentation. The kitten had not been vaccinated and had not received an anthelmintic treatment. The diet provided consisted of home-prepared, high-protein food, including rice, boiled chicken liver, and chicken meat, given two to three times daily. Drinking water was supplied from tap water (municipal water) and provided ad libitum. The kitten was allowed to roam freely indoors and in the yard, together with four other cats.

Physical Examination and Clinical Signs

Inspection was performed by observing the right eye, followed by palpation of the periocular area. The examination revealed that the right eye was non-functional and had undergone

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necrosis. Evaluation of the menace response, pupillary light reflex, and pupillary reflex showed no response in the right eye (Figure 1).

The cat's present status was as follows: heart rate 155 beats per minute, pulse rate 125 beats per minute, body temperature 38.5°C, respiratory rate 30 breaths per minute, capillary refill time less than 2 seconds, and good skin turgor. Examination of the oral mucosa and conjunctiva, as well as the cardiovascular, respiratory, nervous, and digestive systems, revealed no abnormalities. The cat appeared healthy and active. Clinically, a marked prolapse of the right globe was observed, characterized by a reddish appearance, abnormal ocular structure, and lacrimation accompanied by clear exudate.

Supporting Examinations

A hematological examination was performed as a supporting diagnostic test to evaluate the general health status of the cat prior to treatment. Routine hematological analysis revealed leukocytosis and thrombocytopenia (Table 1).

Diagnosis and Prognosis

Based on the anamnesis, physical examination, clinical findings, and supported by hematological results, the cat was diagnosed with prolapse of the right globe (prolapsus bulbus oculi dextra) with an infausta prognosis.

Treatment

Prior to surgery, the cat was fasted from food for 12 hours and from water for 4 hours to reduce the risk of vomiting and urination during the surgical procedure. The hair surrounding the right eye was shaved to minimize contamination, followed by cleansing with 5% povidone-iodine and 0.9% NaCl solution. Fluid therapy was administered subcutaneously using 5 mL of physiological 0.9% NaCl solution (PT. Widiarta Bhakti, Pasuruan, Indonesia) to replace fluid loss and correct electrolyte imbalance during the surgical procedure. Vitamin K (phytomenadione; PT. Phapros, Jakarta, Indonesia) was administered intravenously at a dose of 1 mg/kg BW two hours prior to surgery to anticipate potential bleeding during the operation.

A thorough physical examination was performed prior to surgery, including assessment of pulse rate, respiratory rate, heart rate, body temperature, and evaluation of all body systems. Premedication was administered using atropine sulfate (PT. Ethica Industri Farmasi, Bekasi, Indonesia) at a dose of 0.03 mg/kg BW subcutaneously to reduce respiratory secretions and provide antimuscarinic effects. Fifteen minutes later, anesthesia was induced with a combination of ketamine (PT. Ferron Par Pharmaceuticals, Bekasi, Indonesia) at a dose of 11 mg/kg BW and xylazine (PT. Tekad Mandiri Citra, Bandung, Indonesia) at a dose of 2 mg/kg BW, administered intramuscularly.

After the animal was adequately anesthetized, it was positioned in left lateral recumbency. Enucleation of the prolapsed globe was performed using a transconjunctival approach. The periocular area and the eye were cleansed again with physiological NaCl solution, followed by application of 5% povidone-iodine around the eye. A careful incision was made through the extraocular muscles using curved iris scissors to allow removal of the globe from the orbital cavity. The globe was gently retracted until the base of the eye was visible, and the blood vessels and optic nerve were ligated using 3/0 polyglactin 910 (Vicryl®) suture material (Figure A). Damaged tissue of the globe was excised above the ligation site (Figure B), and the surgical field was examined for the presence of hemorrhage. Subsequently, new incisions were made along the margins of the upper and lower eyelids (Figure C). The incised and ligated areas were irrigated with physiological NaCl solution and cleaned using sterile gauze to remove residual blood clots. Subcutaneous tissues were sutured using a simple continuous pattern with 3/0

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polyglactin 910 suture material (Figure D). The edges of the superior and inferior palpebrae were closed using a subcuticular suture pattern with the same suture material and size (Figure E). After suturing, the surgical area was again cleansed with physiological NaCl solution and treated with 5% povidone-iodine.

Postoperative Care

Postoperative management included administration of cefotaxime at a dose of 20 mg/kg BW every 12 hours intramuscularly and the anti-inflammatory drug meloxicam at a dose of 0.2 mg/kg BW every 24 hours subcutaneously. Wound care involved topical application of neomycin sulfate antibiotic powder (Enbatic®, PT. Erela, Semarang, Indonesia) to the incision site in sufficient amounts until the wound dried. An Elizabethan collar was applied to restrict movement and prevent the cat from scratching the surgical wound. Oral postoperative medications included cefixime at a dose of 10 mg/kg BW every 12 hours for seven days and meloxicam tablets at a dose of 0.1 mg/kg BW every 24 hours for five days. Supportive therapy with Fufang E'jiao Jiang® was administered orally at a dose of 0.5 mL/kg BW every 24 hours. The incision site and the degree of swelling were evaluated until day seven postoperatively.

RESULTS AND DISCUSSION

Results

Postoperative wound healing was evaluated from day 1 to day 7 (Table 2). On day 1, the cat showed a good appetite and water intake, with normal defecation and urination, and began to appear active. The incision site appeared moist, swollen, and erythematous, and a pain response was still observed on palpation. Fluid discharge from the orbital cavity through the incision site was noted.

On day 2, the cat remained active with good appetite and water intake, and normal defecation and urination. The incision site was moist and still showed signs of inflammation, characterized by mild swelling and slight redness. The amount of fluid discharged from the orbital cavity through the incision site had begun to decrease. On day 3, the cat appeared active with good appetite and water intake, and normal defecation and urination. The incision site remained moist and continued to show inflammatory signs in the form of mild swelling and slight redness. Fluid discharge from the orbital cavity through the incision site was minimal and almost absent. On day 4, the inflammatory response gradually subsided. The cat was active, with good appetite and water intake, and normal defecation and urination. On day 5, the incision site began to dry slightly. The cat remained active with good appetite and water intake, and normal defecation and urination. On day 6, the surgical incision continued to dry progressively. The cat was active, with good appetite and water intake, and normal defecation and urination. On day 7, the surgical wound had not completely dried. The cat remained active, with good appetite and water intake, and normal defecation and urination.

Discussion

Prolapse of the globe (prolapsus bulbus oculi) is defined as the displacement of the eyeball from the orbital cavity (cavum orbita) and may be accompanied by subconjunctival hemorrhage up to complete transection of the optic nerve. In this case, the globe had already undergone necrosis; therefore, enucleation of the globe was selected as the appropriate treatment. This decision is consistent with the opinion of Mitchell (2008), who stated that enucleation is indicated when the eye is blind and associated with pain that cannot be resolved through medical therapy.

One of the causes of globe prolapse is infection by Chlamydia bacteria. These bacteria persistently infect ocular epithelial cells, as well as the respiratory and gastrointestinal tracts.

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The Chlamydia species most commonly infecting the eyes of cats is Chlamydia felis, which can cause both acute and chronic conjunctivitis in cats (Syakes, 2013). Enucleation of the globe in cats is generally performed to remove an eye that is no longer able to function normally. In this case, the cat undergoing enucleation had an abnormality of the right eye.

Enucleation of the globe can be performed using two surgical approaches: the transconjunctival approach and the transpalpebral approach. In this case, enucleation was performed using the transconjunctival approach. According to Al-Antary (2018), this technique offers advantages such as easier access to the optic nerve and blood vessels while minimizing removal of extraocular muscles, thereby maintaining better cosmetic outcomes because the orbital cavity does not appear empty. In this approach, all lacrimal glands must also be removed, as retained lacrimal tissue may continue to produce tears that can drain through alternative pathways, potentially resulting in fistula formation between the orbital cavity and the nasal cavity.

Postoperative treatment included parenteral administration of the antibiotic cefotaxime and the anti-inflammatory drug meloxicam, followed by oral administration of cefixime for seven days. Meloxicam was administered for five days as an anti-inflammatory and antipyretic agent. Wound care involved the application of gentamicin and neomycin antibiotic powder until the incision site dried. These treatments were intended to reduce the risk of secondary postoperative infection. Cefotaxime is a third-generation cephalosporin antibiotic with bactericidal activity that works by inhibiting mucopeptide synthesis in the bacterial cell wall. It is highly stable against beta-lactamase hydrolysis and is therefore used as a first-line alternative for bacteria resistant to penicillin. Cefotaxime has a broad spectrum of activity against both Gram-positive and Gram-negative organisms (Sumano *et al.*, 2004). Cefixime is also a bactericidal agent that inhibits bacterial cell wall synthesis (Memon, 1997).

The cat was additionally treated with the nonsteroidal anti-inflammatory drug (NSAID) meloxicam postoperatively. Meloxicam is an enolic acid derivative of the oxicam group, and its mechanism of action is related to inhibition of prostaglandin synthesis via cyclooxygenase inhibition (Yocum *et al.*, 2000). NSAIDs exert combined anti-inflammatory and antipyretic effects by reducing the production of prostaglandins and thromboxanes. Prostaglandins are major metabolites of arachidonic acid, and their inhibition suppresses inflammation and alleviates pain.

Wound healing is a dynamic process involving body tissues, blood vessels, extracellular matrix, and parenchymal cells (Dam *et al.*, 1999). Initially, blood within the wound coagulates, followed by an inflammatory response that clears necrotic cells and bacteria. Fibroblasts and blood vessels extend into the fibrin clot, collagen accumulates, and over time collagen gains strength through cross-linking and remodeling. Wound healing in tissues damaged by trauma can be divided into three phases: the inflammatory phase, the proliferative phase, and the remodeling phase. Supportive therapy using fufang ejiao jiang® was also administered as a traditional medicine to improve blood production in the anemic condition observed in the case cat.

Postoperative care during the first and second days included application of pressure to the operated eye area to reduce fluid accumulation that could interfere with healing. Postoperative observations from day 1 to day 3 showed that the incision site remained moist, swollen, erythematous, and painful upon palpation, indicating ongoing hemostasis and inflammation. Hemostasis plays a protective role in wound healing. The release of protein-rich exudate into the wound causes vasodilation and the release of histamine and serotonin, allowing phagocytes to enter the wound area and remove dead cells (Diegelmann & Evans, 2004). The inflammatory phase is characterized by tumor (swelling), *dolor* (pain), *rubor* (redness), *calor* (heat), and

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functio laesa (loss of function). During this phase, edema, ecchymosis, redness, and pain are commonly observed (Alvarenga *et al.*, 2015).

By day 4, inflammation had resolved, and the cat exhibited good appetite and water intake, with normal defecation and urination. Improvement in wound healing was also influenced by improved nutritional status. On day 5, no signs of inflammation were observed, and the wound began to dry slightly. By day 6, the incision site continued to dry progressively, with normal appetite, water intake, defecation, and urination. On day 7, the incision site had not completely dried, but the cat maintained good appetite and water intake, with normal defecation and urination.

CONCLUSION AND SUGGESTIONS

Conclusion

Management of prolapse of the right eyeball (*bulbus oculi dextra*) in the cat was performed through surgical enucleation using a transconjunctival approach. Based on wound observations up to the seventh day postoperatively, the wound healing process progressed well without any signs of infection at the surgical site.

Suggestions

Cases of oeyeball prolapse in cats should be managed promptly and followed by appropriate treatment to prevent wound infection. Attention should be given to the hygiene of the animal and its environment to avoid further infection, myiasis, and other complications. Regular health examinations, deworming, and complete vaccination are also recommended for cats.

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Tables

Table 1. Hematological examination results

Parameter	Value	Reference range*	Interpretation
WBC (10^3/µL)	35.3	5.5-19.5	High
Lymphocytes (%)	29.4	12-45	Normal
RBC (10^6/µL)	5.52	4.6-10	Normal
HGB (g/dL)	9.1	9.3-15.3	Low
MCV (fL)	49.6	39-52	Normal
MCH (pg)	16.4	13-21	Normal
MCHC (g/dL)	33.3	30-38	Normal
PLT (10^3/µL)	84	100-514	Low
HCT (%)	27.3	28-49	Low

* Hematology analyzer (Mindray®). Abbreviations: WBC=White blood cells; RBC=Red Blood Cells; HGB=Hemoglobin; MCV=Mean Corpuscular Volume; MCH=Mean Corpuscular Hemoglobin; MCHC=Mean Corpuscular Hemoglobin Concentration; PLT=Platelet; HCT=Hematocrit.

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Table 2. Postoperative observation results from day 1 to day 7

Post-operative observations	Observation results	Description
Day 1		The incision wound appeared moist, swollen, and erythematous, with a pain response on palpation. Fluid discharge was observed from the *cavum orbita* through the incision site.
Day 3		The incision remained moist and still showed signs of inflammation in the form of mild swelling with slight redness. Fluid discharge from the *cavum orbita* through the incision had decreased markedly and was almost absent.
Day 5		The wound had begun to dry. The cat appeared active, with good appetite and water intake, and normal defecation and urination.
Day 7		The surgical incision had not completely dried. The cat was active, with good appetite and water intake, and normal defecation and urination.

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Figures

Figure 1. Case animal with prolapse of the right eyeball The eyeball appears reddish, indicating inflammation.

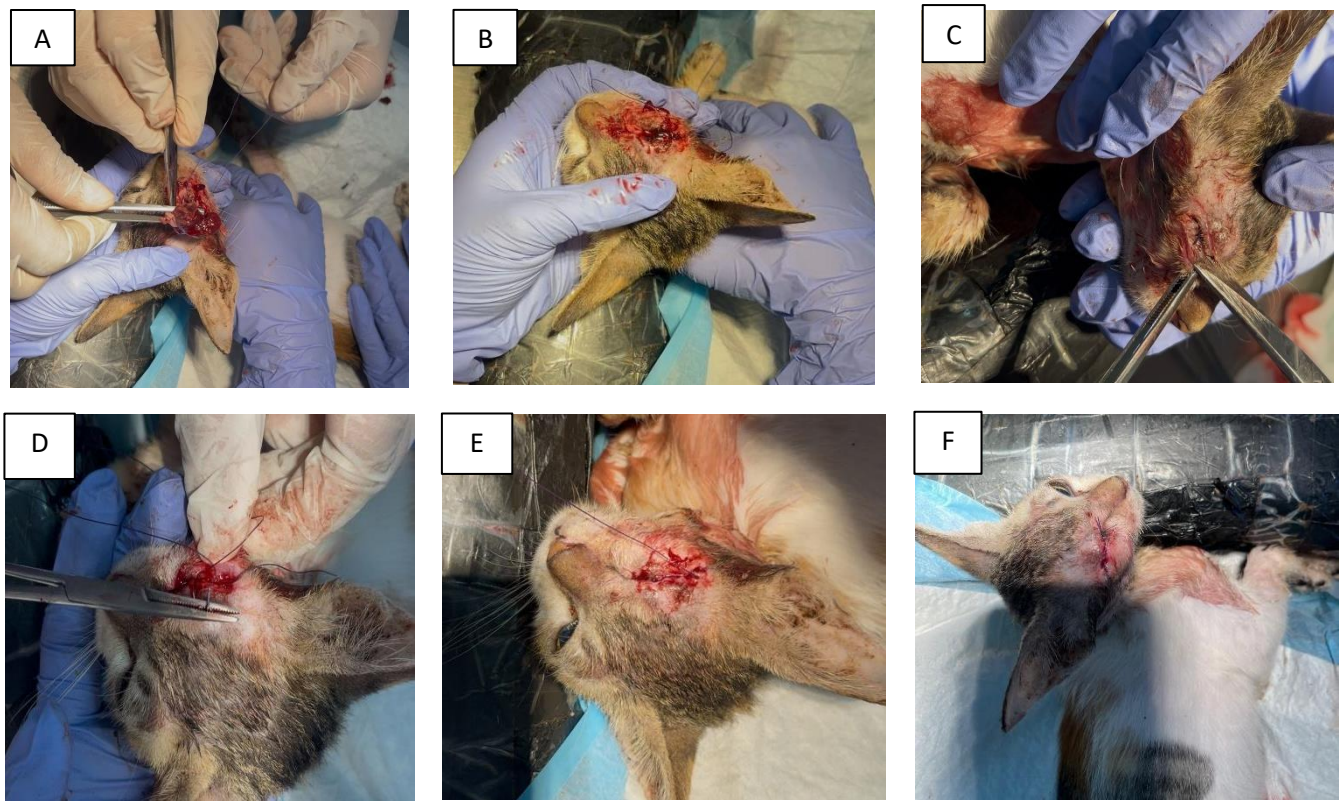

Figure 2. Enucleation procedure performed on the case cat. Ligation at the base of the eyeball using Vicryl 3/0 suture (A), excision of damaged ocular tissue above the ligation site (B), creation of a new incision along the margins of the upper and lower eyelids (C), subcutaneous suturing with a simple continuous pattern using Vicryl 3/0 (D), suturing of the *palpebra superior* and *palpebra inferior* margins with a subcuticular pattern using Vicryl 3/0 (E), and the condition of the cat after surgery and wound closure (F).

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