

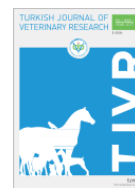


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## Diagnosis and treatment of retrobulbar abscess in the White New Zealand Rabbit (*Oryctolagus cuniculus* L.)

Zeynep Bozkan Ünal<sup>1</sup> Ezgi Sude Aybak<sup>1</sup> <sup>1</sup> Department of Surgery, Faculty of Veterinary Medicine, Aydın Adnan Menderes University, Aydın, Türkiye.

Correspondence: Zeynep Bozkan Ünal (zbozkan@adu.edu.tr)

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### ABSTRACT

Although retrobulbar abscesses are known as commonly encountered in domestic rabbits, there is insufficient information regarding the diagnosis, treatment, and outcomes of the disease. It is also known that retrobulbar and skull abscesses are among the most difficult to treat. A 4-yr-old, 3 kg, male, White New Zealand rabbit (*Oryctolagus cuniculus* L.) was presented for exophthalmos in the left eye which started a while ago and progressed rapidly. On ophthalmologic examination deviation of the globe, third eyelid prolapse, chemosis, inability to blink and subsequent severe keratitis was noted. Diagnostic CT and ocular ultrasound were used and a mass compatible with abscess was detected in the retrobulbar area. Following unresponsive medical treatment, the abscess was surgically removed and the eye globe with irreversible damage was enucleated. Postoperative anti-inflammatory and antibiotic were prescribed, a drain was placed into socket. Although the treatment process was prolonged due to the relapse of the abscess 2 weeks after the operation, the patient fully recovered following local and systemic medical treatment for another 2 weeks. This study was to provide detailed information about the clinical findings, diagnosis, treatment and outcomes of retrobulbar abscess in a domestic rabbit.

**Keywords:** Exophthalmos, Rabbit, Retrobulbar abscess, Tomography, Ultrasound

### INTRODUCTION

Retrobulbar abscess is characterized by the collection of purulent material in the retrobulbar space. Unilateral exophthalmos is the most prominent clinical sign of a retrobulbar abscess and may be accompanied by other symptoms such as stagnation, facial swelling, weight loss, gastrointestinal disease, ocular or nasal discharge, chewing or swallowing problems (Wagner and Fehr, 2007; Levy and Mans, 2023).

Diagnostic imaging modalities can be used to diagnose retrobulbar abscesses. Ultrasonography reveals a round pathologic structure filled with dense material. CT and MRI play significant role for

diagnosis and surgical planning. (Capello, 2011; Levy et al., 2023).

Retrobulbar and skull abscesses are the most difficult to treat, of all the abscesses occurs in rabbits. The treatment usually involves either administration of wide-spectrum antibiotics alone or in combination with surgical removal of the abscess. In small animals, drainage of the abscess through the pterygopalatine fossa is the most used approach (Bennett, 2004; Van Den Top et al., 2007).

This report was aimed to provide elaborative information about the clinical findings, diagnosis, treatment and outcomes of retrobulbar abscess in a domestic rabbit based on lack of the detailed information on this topic.

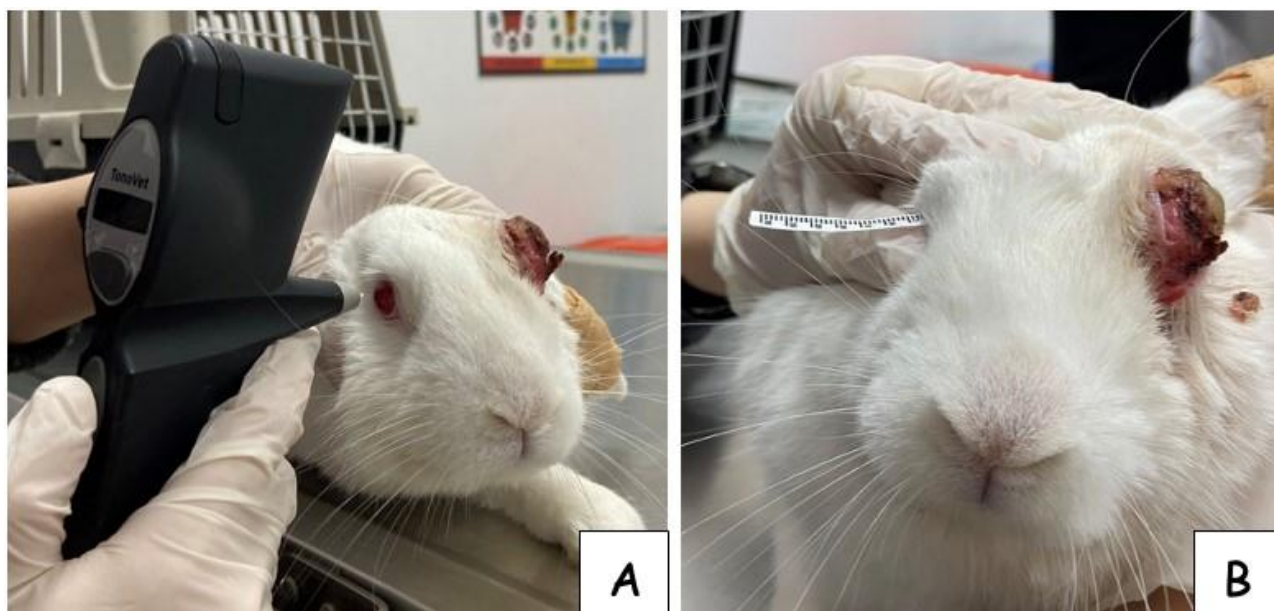
## CASE HISTORY

In this case report, a 4-year-old, 3 kg, male, New Zealand rabbit (*Oryctolagus cuniculus* L.) was complained of exophthalmos in the left eye which started 4 weeks ago and progressed rapidly.

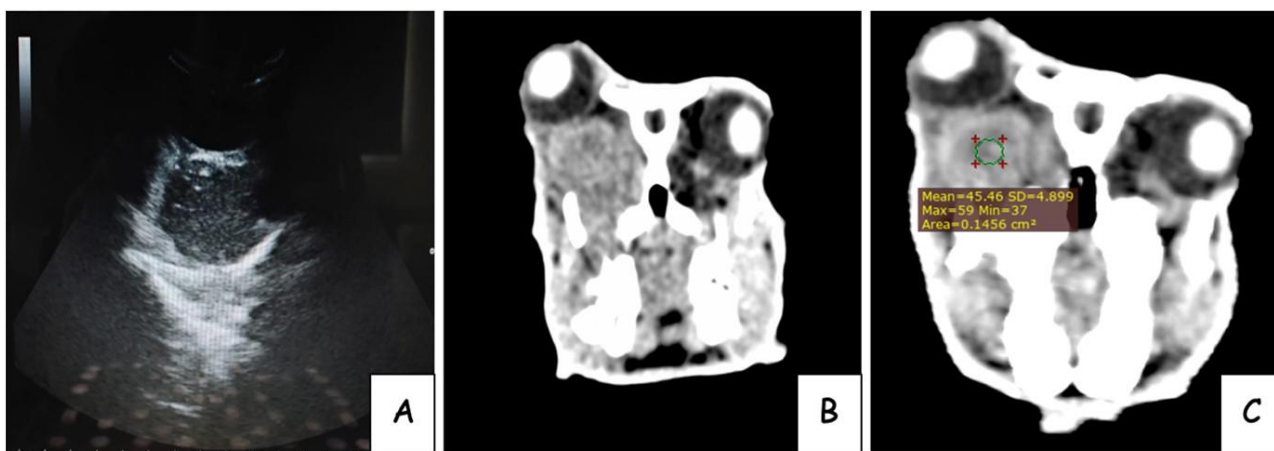
The patient had a previous history of local treatment with moxifloxacin (Demoxif Eye Drops, 5mg/ml, Deva Holding Istanbul, Turkey) which was administered for one week without response. It was stated that the general condition of the patient was slightly affected with mild loss of appetite.

Body condition score was poor (thin) and no other abnormal findings were found in physical examination. In the complete blood analysis (H 60

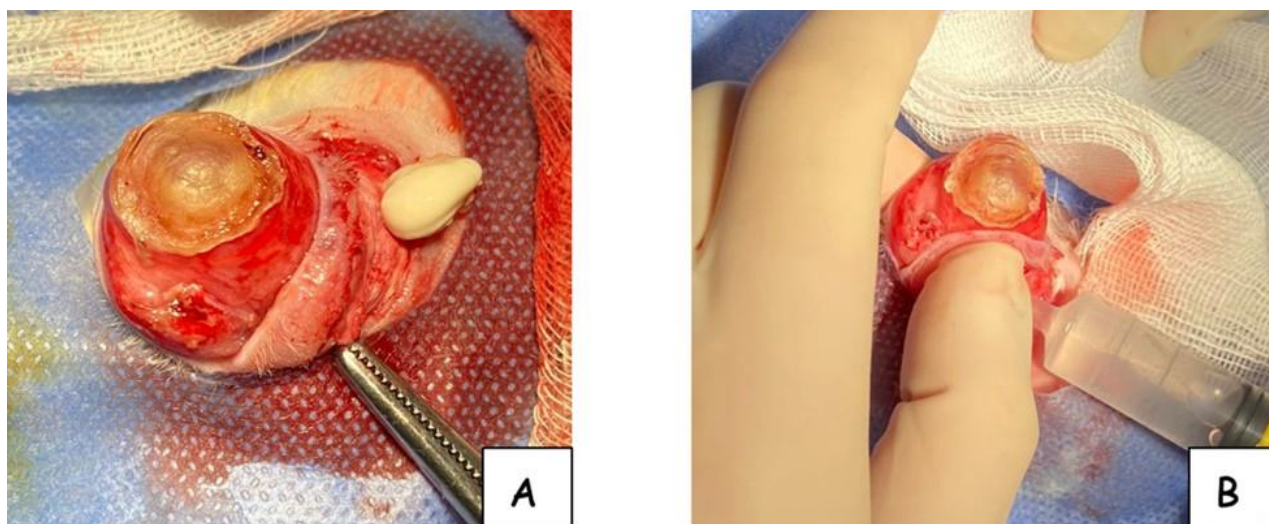
Vet- Edan Veterinary Hematology Analyzer), all data were within the reference values. Blepharoconjunctivitis, xerophthalmia, and exophthalmos were noted, and pupillary light and threat reflex was negative in the left eye. Tear volume with the Schirmer Tear Test-I and intraocular pressure with a tonometer were measured as 6 mm and 13 mmHg, respectively, in the healthy right eye, but no measurements could be taken in the left eye. (Figure 1). Ultrasonographic examination (Esaote Mylab 25 Vision Portable Ultrasound Scanner, micro convex probe was used) revealed a mass consisted of hypoechoic material filled with multiple small echogenic foci looks like inflammatory cells and small fibrous strands the caudal to the eye (Figure 2).



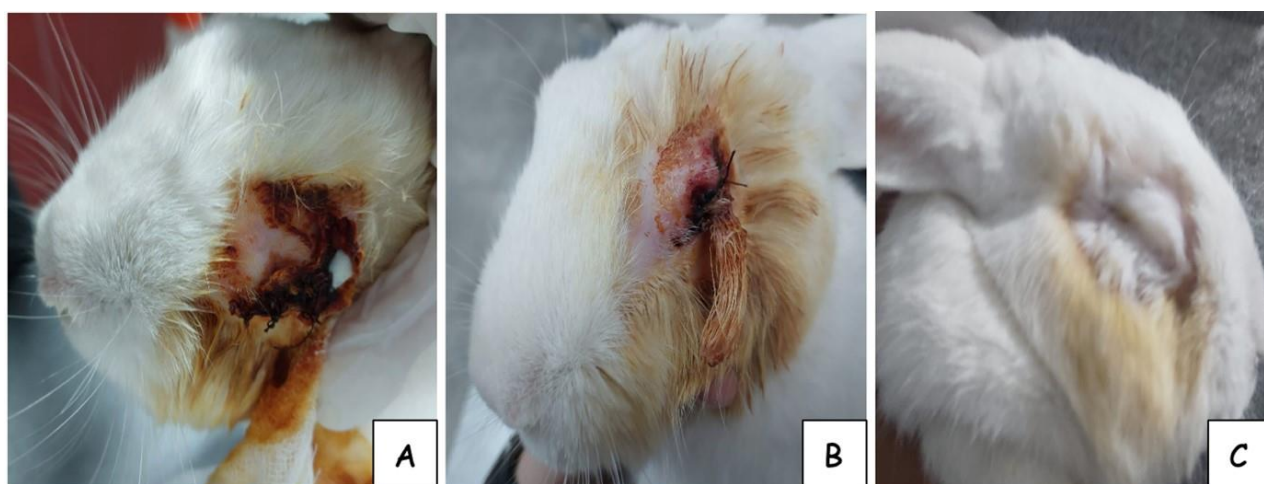
**Figure 1.** Intraocular pressure measurement with tonometer (A), Schirmer Tear Test-I application (B).



**Figure 2.** USG image of a swelling consisting of hypoechoic material with a small echogenic foci caudal to the left eye (A). Tomography image taken in the soft tissue window in the transversal section showing an abscess structure surrounded by a capsule caudal to the eyeball (B). HU value of the abscess content (C).



**Figure 3.** Drainage of retrobulbar abscess. The abscess sac was reached through an incision made just below the eye, over the zygomatic arch and the toothpaste-like pus was completely cleaned (A) by irrigating with 3% boric acid solution (B).



**Figure 4.** The eye cavity filled with pus again 2 weeks after the operation (A). The eye after cleaning and treatment (B). The eye 2 months after the operation (C).

Systemic enrofloxacin, which is a safe, easy-to-dose and easy-to-administer first-line antibiotic for rabbits if there is no antibiogram, (5 mg/kg, PO, 2x1, Baytril® 2.5%, 25 mg/ml, Bayer Türk Kimya San. Ltd. Şti.) and, 3 times a day local Carbomer (Viscotears®, 2 mg/g eye gel, Bausch & Lomb, İstanbul, Türkiye), Diclofenac Sodium (İnflased Eye Drops, 1mg/1ml, Bilim İlaç, İstanbul, Türkiye) and moxifloxacin (Demoxif® Eye Drops, 5mg/1ml, Deva Holding, İstanbul, Türkiye) was prescribed as medical treatment for a few days to support the general condition of the patient and to protect the integrity of the eyeball until the operative intervention.

When the patient was brought back to the clinic aggravated corneal lesions and ulceration was seen despite the treatment. Tomography images showed

a mass in the caudal part of the eyeball with a relatively low attenuation density of 45.46 HU, surrounded by a ring-shaped capsule with clear borders, which was clearly pushing it, supporting the suspicion of an abscess. No lysis of adjacent bone structures was observed and no dental infection finding was seen. Since the eye damage was irreversible, remove the abscess concurrently transpalpebral enucleation was performed.

Anesthesia maintained with in the intubated patient be inhaling Isoflurane (Isoflurane USP) in 100% oxygen after administering xylazine hydrochloride (5 mg/kg, IM, Xylazinbio® 2%, 20 mg/ml, Intermed, Yenisehir/Ankara, Türkiye) and ketamine hydrochloride (30 mg/kg, IM, Ketazol® 10%, 100 mg/ml, Richter Pharma, Ankara, Türkiye) for induction. The patient was intubated with the



help of an otoscope. The surgical area was prepared following the principles of asepsis.

First, abscess was removed to ease enucleation of the eye and to prevent hematogenous infection (Figure 3). Then, transpalpebral enucleation was performed. Incisions were closed with simple separate sutures using 3-0 multifilament absorbable material (GMD, İstanbul, Türkiye). An opening was left in the last part of the lateral suture line and a drain was applied from this area. A sample was taken for microbiologic examination, but no results were obtained.

Meloxicam (0.2 mg/kg, SC SID, Bavet® Meloxicam, 5 mg/ml, Arion İlaç, Tuzla/İstanbul, Türkiye) for 2 days and Enrofloxacin (5 mg/kg, PO, BID, Baytril® 2.5%, 25 mg/ml, Bayer, Ümraniye/İstanbul, Türkiye) for 7 days were prescribed postoperatively. Also, a collar was recommended, and the drain was changed every 2 days and povidone iodine was consistently applied to the suture line and drain. No other applications such as ointment etc. was made into the cavity.

The drain was completely removed 7 days after the operation and in two days pus accumulation relapsed (Figure 4A). The abscess sac was irrigated daily with 3% boric acid and batikon was applied (Figure 4B) and a different antibiotic, doxycycline (Levadoks® 20%, 200 mg/ml, Netfarma, İstanbul, Türkiye), which is another safe option that does not have any negative effects on the intestinal flora of rabbits, was prescribed. No discharge was encountered in subsequent follow-up visits. One month after the operation, the patient recovered completely, and 2 months later, we received information from the owner that there was no problem or recurrence in our patient (Figure 4C).

## DISCUSSION

Retrobulbar abscesses may be idiopathic, result from endodontic or hematogenous infection, or local injury (Martínez-Jiménez et al., 2007; Tremolada et al., 2015). In presented case, no dental or gingival problem was found. It was learned that he had only a mild trauma to his eye. Therefore, the cause of retrobulbar abscess formation in this case was thought to be posttraumatic inflammation.

Orbital abscesses are usually a chronic condition and can affect other organs through vascular or lymphatic bacterial dissemination. Patients present with normal to decreased appetite and physical activity depending on the degree of pain. Since the pain is not very pronounced in rabbits, owners may

not recognize the problem in the initial stages of the disease (Thomas et al., 2020). Our case was mildly lethargic and anorexic and, there was severe exophthalmos, keratoconjunctivitis without pupillary light and threat reflex.

Ocular ultrasound is useful for obtaining samples or draining abscess sites. However, it is difficult to assess the extent of orbital involvement with ocular ultrasound alone. (Van Den Top et al., 2007; Herrmann et al., 2021). CT, the most common diagnostic modalities, can help determine the size of a mass lesion and has the advantage of detecting bone changes such as osteolytic or osteoproliferative lesions, including dental structures. However, CT is not reliable when differentiating between inflammatory and neoplastic formations in soft tissue. In our case, both ultrasound and CT were performed without the need for anesthesia. In both procedures, the patient was kept wrapped in a heavy towel. The echogenicity of the pathological structure detected behind the eye on ocular ultrasound was not compatible with fluid, it had multiple echogenic foci and was thought to be inflammation cells and fibrous fragments, so an abscess was considered. On the CT image, the pathologic structure located behind the eye and clearly pushing it was limited by an annular capsule and contained a mass with a density of 45 HU, which was consistent with a retrobulbar abscess. The diagnosis of retrobulbar abscess was confirmed with the toothpaste-like pus coming from the retrobulbar space during the operation.

Treatment of a retrobulbar abscess in the rabbit can be particularly challenging. Because of the thick nature of the abscess material and the anatomy of the alveolar bulla. In some cases, aggressive surgical debridement may be necessary. Enucleation of the eye for access to the retrobulbar space may be considered (Van der Woerd, 2012; Pumphrey and Wayne, 2022). In our case, because of irreversible corneal damage and severe proptosis, it was decided to enucleate the eye with retrobulbar abscess. Because pus accumulation relapsed in the following periods antibiotic was changed, and no discharge was seen after 1 week of treatment.

Retrobulbar abscess is an important disease in rabbits because it may cause visual impairment and may be life threatening. This report summarizes the clinical findings, diagnosis, treatment and outcomes of retrobulbar abscess in a domestic rabbit.

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**Author contributions:** ZBÜ and ESA performed surgery. ZBÜ designed the study. ZBÜ and ESA collected data. ZBÜ and ESA made analysis/or interpretation. ZBÜ and ESA made literature review. ZBÜ and ESA wrote the article. ZBÜ criticized the article. ZBÜ: Zeynep Bozkan Ünal, ESA: Ezgi Sude Aybak

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