

**Nasolacrimal duct obstruction due to periodontal disease in domestic rabbit, *Oryctolagus cuniculus* - case report**

**Obstrução do ducto nasolacrimal devido à doença periodontal em coelho doméstico, *Oryctolagus cuniculus* - relato de caso**

DOI:10.34117/bjdv8n8-352

Recebimento dos originais: 21/06/2022

Aceitação para publicação: 29/07/2022

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**ABSTRACT**

Rabbits are animals with a high prevalence of periodontal diseases, which can be explained by anatomical particularities. The roots of the incisive and premolar teeth of the maxilla are very close to the lacrimal duct, and in addition, these animals have continuous teeth growth which can predispose to compression and obstruction of the nasolacrimal duct, resulting in dacryocystitis and leading to secondary ophthalmic problems. As visualization of the oral cavity is only possible under sedation, dental problems are often underdiagnosed. The present report aims to show the case of a female rabbit which had chronic conjunctivitis with purulent secretion associated with the nasolacrimal duct obstruction, secondary to periodontal disease.

**Keywords:** dacryocystitis, lagomorphs, tooth root, osteomyelitis.

**RESUMO**

Os coelhos são animais que apresentam alta prevalência de doenças periodontais, o que pode ser explicado por particularidades anatômicas. As raízes dos dentes molares e pré-molares da maxila localizam-se próximas ao canal lacrimal e, além disso, esses animais possuem crescimento dentário contínuo, o qual pode predispor à compressão e obstrução do ducto nasolacrimal, resultando em dacriocistite e levando à problemas oftálmicos secundários a doença periodontal. Como a avaliação da cavidade oral na maior parte das vezes só é possível sob sedação, alterações odontológicas podem ser frequentemente subdiagnosticadas. O presente relato tem como objetivo mostrar o caso de uma coelha que apresentava conjuntivite crônica com secreção purulenta associada à obstrução do ducto nasolacrimal, secundária à doença periodontal.

**Palavras-chave:** dacriocistite, lagomorfos, raiz dentária, osteomielite.

**1 INTRODUCTION**

Rabbits are animals of the order Lagomorpha, which are characterized by some anatomical structural particularities, such as elodont dentition, presenting continuous teeth growth; radicular hypsodont, with long crowns and open roots (BASKIN *et al.*, 2021) and duplicidentata, with two pairs of the same tooth, the maxillary incisor (CAPELLO and GRACIS, 2005). Events related to nutrition, trauma, age, or hereditary

genetic components associated with dental characteristics can predispose dental pathologies in rabbits, causing changes in the cranial bones or teeth (LENNOX, 2008). These conditions present a high rate of involvement at different ages, being the excessive growth of the incisor teeth more common in young animals, with an average rate of 43,20%, and 7,10% in the elderly, while the irregular growth of molar and premolar are more common in the elderly, with 80,60% of involvement, and 16,90% in the young ones (KHARITONOVA; BOKHINA; KLYUKIN, 2022).

Anatomically, there is still a proximity of the incisors and premolars' roots with the passage of the nasolacrimal duct, between the lacrimal and maxillary bones (FERREIRA *et al.*, 2020), and the duct presents tortuosities very close to the teeth roots (TURNER, 2010), predisposing, in case of pathological elongation of the dental roots, morphological occlusion of the nasolacrimal duct (FERREIRA *et al.*, 2020) and in an advanced stage, there is a potential for penetration of the periosteum by the roots, leading to the formation of a retrobulbar or lacrimal bone abscess, causing secondary ophthalmic problems (HARCOURT-BROWN, 1997). Optical pathologies may present evident physical abnormalities, visible or palpable, close to or inside the oral cavity, with nasal and lacrimal discharges, exophthalmos, malocclusion and dental discoloration being common; or behavioral changes, such as anorexia, hyporexia, apathy, or lack of grooming (VERSTRAETE and OSOFSKY, 2005; ARTILES *et al.*, 2020).

Nutritional, environmental, and respiratory causes should also be analyzed, such as use of oily or thick compounds application near the eyes (MAINI and HARTLEY, 2019). Bacterial infections secondary to oral trauma should also be considered, since they can lead to inflammation and reabsorption of the periodontal ligament, predisposing the formation of pockets in the periodontal spaces and proliferation of anaerobic bacteria, which may also lead to the occurrence of abscesses and osteomyelitis (CROSSLEY, 2003).

## 2 CASE REPORT

A domestic rabbit (*Oryctolagus cuniculus*), female, 1 year old, fertile, weighing 5,73 lbs (2,6 kg) was referred for clinical evaluation. The tutor reported the animal had a whitish secretion in the right eye for the last three months and had already been treated with topical and systemic antibiotics for this period, but with no effectiveness. The animal lived inside the owner's bedroom, with feed and hay offered *ad libitum*. It had been eating normally and showed no behavioral changes. During the physical examination it was

observed hyperemic blepharoconjunctivitis, ocular secretion of caseous material and severe inflammation in the right ocular region close to the lacrimal sac or dacryocystitis (Figure 1).

Figure 1: Inflammation in the lacrimal sac region and purulent secretion in the right eye (Dacryocystitis).



Fonte: Personal file (2022).

Visualization and intraoral inspection were not possible, as the responsible for the animal chose not to sedate her on the appointment. Ocular secretion was collected with a sterile swab for cytological evaluation, culture and antibiogram; a fluorescein exam was performed to check the eye integrity (tested positive), and a complete blood count test and skull x-ray were requested. The patient was sent home with the following prescription: eye cleaning with saline solution three times a day and tobramycin eye drops (1 drop/q.i.d./10 days), while the results of the requested exams were pending.

The blood count showed a normocytic normochromic anemia, with 4,50 million/mm<sup>3</sup> (red blood cells), 9,0 g/dL (hemoglobin), 30,0% (hematocrit), 66,7 fL (M.C.V.), 30,0% (M.C.H.C.). And the white cell count also revealed alterations, with mild leukopenia (5,30 mm<sup>3</sup>), lymphopenia (6%), neutrophilia (79%) and monocytosis (13%). In the x-ray, performed without sedation, an alteration of the trabecular bone in the zygomatic process of the right maxilla was observed, associated with bone proliferation and increase in volume of adjacent soft tissues, suggestive of the presence of abscess or osteomyelitis (Figure 2).

Figure 2: A) Ventrodorsal projection, alteration of the trabecular bone in the zygomatic process of the right maxilla; B) Lateral projection showing normal occlusion between molars and premolars.

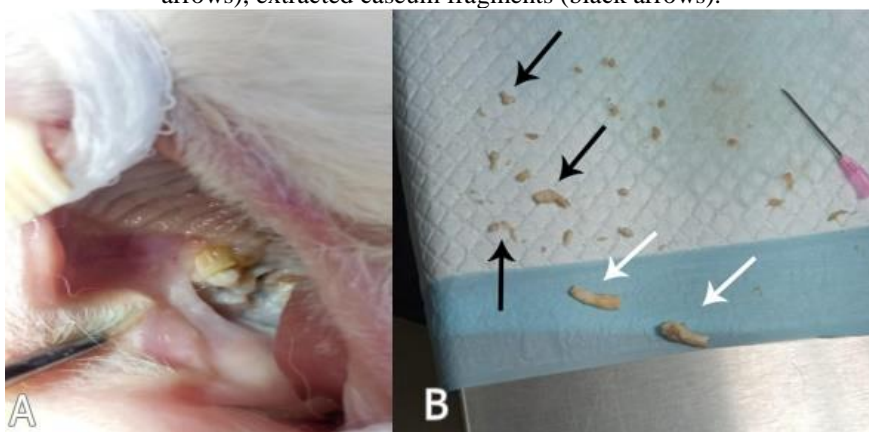


Fonte: Personal file (2022).

Based on the clinical signs associated with the results of the imaging and blood exam, the rabbit's tutor authorized the sedation to evaluate the oral cavity and clear the nasolacrimal duct through catheterization. At this day, the patient also showed hyporexia, apathy, and nasal secretion, being considered in a more critical state.

In the evaluation of the oral cavity, a caseous content was observed in the gums, and it was elected to anesthetize the patient and extract those teeth. The risks were presented to the tutor and the surgery was authorized. During the anesthetic induction, the animal had a cardiorespiratory arrest that could not be reverted. The tutor was notified and she authorized the *post mortem* inspection of the oral cavity. At the examination, it was possible to notice that there was the presence of caseo leaking from inside the gums, and the affected teeth, the maxillary third premolar, and the first and second molars, were softened (Figure 3A). The extraction was performed easily and a large amount of caseous material was removed (Figure 3B).

Figura 3: A) Visualization of the oral cavity after the apicoectomy procedure; B) Extracted teeth (white arrows), extracted caseum fragments (black arrows).



Fonte: Personal file (2022)

### 3 DISCUSSION

Due to the chronicity of the pathology it was not possible to state the primary cause, however, in the anamnesis some factors that linked to a primary ophthalmic disease were discarded, such as straw and hay in the use of bedding, which despite being rough materials that can affect the eyes, would be responsible for primary ophthalmic problems (WINNEPENNICKX, 2020). And O'Neill *et al.* (2020) also contemplates that ocular pathologies should be analyzed together with oral and/or respiratory disorders for a more reliable diagnosis, justifying the suspicion of a dental disorder, which is common in rabbits under human care (KHARITONOVA; BOKHINA; KLYUKIN, 2022).

The imaging exam was performed following the precepts of Jorup and Kjellberg (1948), that when there are soft tissue alterations, these may be associated with bone diseases and the use of radiography is of great importance for the detection of abnormalities and early onset of its treatment. As follows, the radiography is the cheapest exam, but efficient to verify for inflammations associated with bone growth (GOMES *et al.*, 2019), and it's also the first option for an overview of the affected area (PINEDA; ESPINOSA; PENA, 2009). It was thus possible to visualize the bone condition related to dacryocystitis (FOOTE, 2020), enabling the best treatment, removal of affected teeth and treatment of the associated abscess (LENNOX, 2008).

The hematological parameters of white cells referenced by Moore, Zimmermann; Smith (2015) associated with hyporexia and apathy may be related to stress, suggesting that the pain caused by the injury was responsible for the food ingestion decrease and for the release of endogenous glucocorticoids into the bloodstream, causing a decrease in circulating lymphocytes and neutrophils, and monocytosis (SILVA *et al.* 2008). Ocular cytology didn't showed bacterial growth, which can be explained by the long period of treatment with antimicrobial agents, but it could be observed a slight eosinophilic staining, moderate amount of neutrophils, intact lymphocytes, moderate amount of red blood cells, and dispersed collagen fibers, suggesting an inflammatory infiltrate (COWELL *et al.*, 2009), which is compatible with the initial visual inspection of the rabbit.

Rabbits are considered the most difficult species to anesthetize, between the laboratory animals, due to the high dose/effect responsiveness of commonly used drugs, leaving a narrow margin of safety between the anesthetic plane and death, in addition to having a high susceptibility to respiratory arrest during anesthesia, and the difficulty of tracheal intubation (FALCÃO; JUNIOR; COELHO, 2011; JOHNSON, 2010). According

to Marcos (2019), rabbits present an anesthetic risk ten times higher compared to small animals. In addition, the anesthetic procedure can be natural adversity in rabbits, since they have a lower lung capacity, increasing the risk of hypoxia, and the ease of pre-surgical stress can lead to a condition of apnea or fatal arrhythmia (KRALL *et al.*, 2019).

And the prognosis of dacryocystitis in rabbits is already considered reserved, and when there is a chronicity, it is worse, and even if the procedure is successful, there is a tendency for the case to recur, making the treatment difficult (COOPER, 2011).

#### **4 CONCLUSION**

The reported case shows how the pathological chronicity of the periodontal disease associated with dacryocystitis in a class of animal whose handling is already difficult with a poor prognosis, corroborates a greater difficulty in treatment and a worsening of this prognosis. And it's also of great importance the correct primary diagnosis as a determining factor for an improvement in the survival of the animal, as well as its treatment, being essential to carry out complementary exams and an examination of the patient as a whole.

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