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ENTROPION, CORNEAL ULCER AND FUNGAL EYE INFECTION IN A SINDI CATTLE: CASE REPORT

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ABSTRACT: Ophthalmology is of great importance in cattle farming, as it is directly related to animal welfare. Eye injuries and disorders cause physical damage to animals and consequently economic losses for owners. This paper describes the case of a female Sindi cattle with a corneal ulcer, entropion and a positive microbiological test for bacterial and fungal infections. Entropion is an eye condition capable of causing corneal ulcers due to eyelid eversion, which causes the eyelashes to come into direct contact with the eyeball. The clinical signs found in these conditions are blepharospasm, epiphora, conjunctivitis, photophobia, ocular discomfort and conjunctival hyperemia. It is diagnosed through a detailed clinical examination, and to check for corneal ulcers the most effective test is the fluorescein test, while infections (bacterial and fungal) can be detected through microbiological culture. The animal underwent surgery to correct the entropion, and was treated for the other conditions using antibiotics, ocular lubricants, non-steroidal anti-inflammatory drugs, 0.5% atropine eye drops, fetal bovine serum, antifungals and corticosteroids. Despite the range of medications, they were not used simultaneously. At the end of the treatment, the animal showed clinical improvement and returned to its normal activities.
Keywords: Ocular surgery; eyelid eversion; microbiological culture; veterinary ophthalmology; corneal ulcer.

INTRODUCTION

Ophthalmology is of considerable importance in cattle farming, as it is directly linked to animal welfare. In addition to interfering with visibility, eye injuries affect the animal's quality of life, as they cause discomfort and pain (TEODORO, T.G.W., 2019), and also have an impact on reduced grazing, a consequent decrease in weight and a drop in carcass yield (MARTINS, 2021). Among the existing

eye conditions is entropion, which consists of the partial or total inversion of the eyelid edge towards the inside of the eye, which can occur alone or on both lower and upper edges, allowing the eyelashes to come into contact with the cornea and conjunctiva. This continuous contact generates irritation and, not uncommonly, corneal ulcers followed or not by ocular secretions. Entropion can be congenital, spastic or acquired, the latter being uncommon (SLATTER, 1998; SILVA, A. C.E, 2017).

In certain breeds, congenital entropion is more common, while spastic entropion occurs due to continuous and exacerbated eye irritation, which causes the orbicularis muscle to contract and is usually unilateral, while acquired entropion occurs after an eyelid injury. In both cases, the diagnosis is made through inspection and clinical examination, and in some cases secondary infections by opportunistic microorganisms are observed. In this condition, ocular secretion with or without the presence of pus, corneal opacity and discomfort are observed (SLATTER, 1998; STADES et al., 1999, SILVA, A. C.E, 2017).

There are a number of treatment options for resolving entropion, including the eyelid pleating technique, which consists of eversion of the eyelids, with one to two sutures covering the skin and subcutaneous tissue in a suture-reminder pattern in the central part of the eyelid for a fixed period of time, which is not definitive, and is generally used in puppies (SILVA, A. C.E, 2017). Another option for the technique to be used in congenital entropion is the injection of substances into the area of the skin, close to the eyelid margin, which can include the administration of 0.9% sodium chloride solution, long-acting penicillin, mineral oil and botulinum toxin (CLARKE; SPALTON, 1988; GELATT, K. N.; GELATT, J. P 1994; STEEL et al., 1997; HEDLUND, 2007, PAGLIOSA, G. M, 2021).

Animals with entropion with marked eversion require surgery. The most commonly used technique for this is the Hotz-Celsus technique. There is also the modified Hotz-Celsus technique, which also makes it possible to correct entropion (SILVA, A.C. E., 2017). The Hotz-Celsus technique consists of removing a half-moon-shaped segment of skin, the ideal size for correcting the inversion. To carry out this procedure, the animal needs to be well restrained, sedated or anesthetized, regardless of whether local anesthesia is essential. For the post-operative period, the animal should receive systemic and local therapeutic care (PAGLIOSA, G. M, 2021).

Entropion can lead to corneal ulcers, in which there is epithelial rupture leading to stromal exteriorization (SILA and DAVIDSON, 2011; MAIER, G. U et al, 2021). The classification of the ulcer varies according to its depth, being superficial, deep or descemetocele (SLATTER, D., 2001). The initial treatment of corneal ulcers consists of topical drug therapy based on lubricants, anti-inflammatories, antibiotics, and the use of anticollagenolytics (autologous serum and fetal bovine serum) (SANTOS, D. M et. al, 2012). The absence or inefficiency of treatment can lead to rupture, causing temporary or permanent blindness (SLATTER, 2001; GIL TURNES, 2007).

In an injured eye, secondary infections can occur, either due to an imbalance in the local microbiota or opportunistic pathogens, and in cases of infection, a culture and antibiogram are suggested (LEDBETTER and GILGER, 2014).

Various factors such as environment, age, geography, habitat, season and farming systems influence eye infections. However, in large animals the spread of pathogens can be favored by vectors (CONCEIÇÃO & TURNES, 2003; MAIER, G. U et al, 2021). Similar to what has been described with bacteria, the

ocular flora can also contain fungi which, in balance, help to maintain ocular health, but there are others which, after corneal injury, can become pathogenic (GILGER, 2008; MAXWELL et al., 2015; PAL, 2017). Therefore, the opportunism exerted by fungi means that a large proportion of infections arise secondarily, either from other microorganisms, post-traumatic or as a result of decreased immunity (KUMAR et al., 2019; LEDBETTER, 2017; SHIVAJI et al., 2019).

In cases where appropriate treatment is not instituted or cases are irresponsive to the treatments used, in addition to ulcers and other secondary problems, loss of vision is common (GULL, T, 2023).

The aim of this paper is to report the case of a Sindi cattle treated at the Veterinary Hospital of the University of Franca, which had several simultaneous eye conditions, such as entropion, corneal ulcers and fungal and bacterial eye infections, but which still had to undergo surgical correction of the entropion and extensive clinical treatment.

CASE REPORT

A 20-month-old female Sindi bovine animal, pregnant (in the final third of pregnancy), was referred to the veterinary hospital with a history of recurrent eye alterations. According to the owner, there had been a worsening in the three weeks prior to the consultation, when compared to the clinical pictures previously observed. The clinical examination revealed intense blepharospasm, epiphora, slight conjunctival congestion and entropion in the lower eyelid of the right and left eye (more discreet on the latter side). At the same time, material was collected from the right eye for bacterial and fungal culture, using a sterile swab. After collection, two drops of anesthetic eye drops (Alcon® - Proxymetacaine Hydrochloride 5 mg/ml) were instilled in each eye for better evaluation. The cornea in the right eye was then assessed using a portable SLP Z slit lamp (Apramed®) (Figure 1). In addition to the ocular alterations described on primary examination, there was a marked presence of edema, superficial blood vessels and granulation tissue in the cornea. The fluorescein test was positive in the region of five to six clock hours below the granulation tissue.

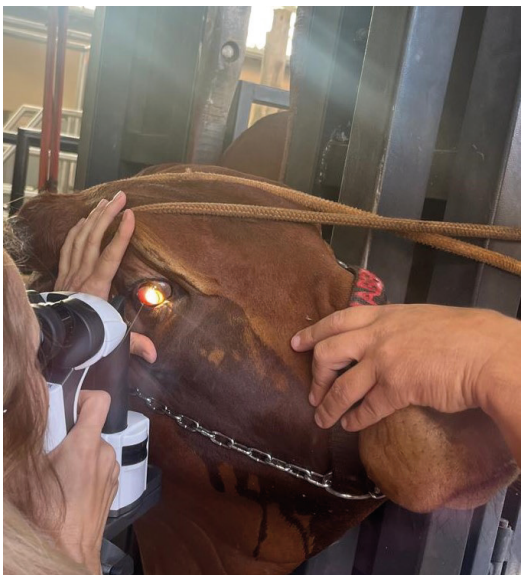

Figure 1. Ophthalmic evaluation, showing corneal examination using a SLP Z portable slit lamp. Right eye.

Source: Personal archive, 2024.

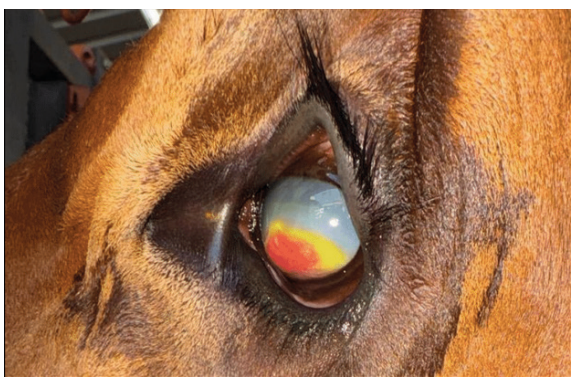

Figure 2: Positive fluorescein test with demarcation of the damaged area in the left eye.

Source: Personal archive, 2024

In the left eye, in addition to the entropion in the lower eyelid, there was a macula, discrete superficial blood vessels in the lower quadrant and a positive fluorescein test (Figure 2) in the central region, at the six o'clock position. The other structures of the left eye were unremarkable.

Initially, treatment was prescribed for both eyes and the use of EDTA - Na2 in HA eye drops 0.75% cross-linked hyaluronic acid (*Manipulado-Drogavet*®), 1 drop, bilaterally, 5 times a day, until further evaluation; Tobramycin (Tobrex-Alcon®) 1 drop, bilaterally, 3 times a day, until further evaluation; Nepafenac (Nevanac- Alcon®) 1 drop, in the right eye, every 12 hours, until further evaluation; Atropine eye drops 0.5% (Allergan®) 1 drop, in the right eye, every 24 hours, for 4 days; Dexpanthenol (Epitegel-Bausch + Lomb®) applied in one layer in both eyes, 4 times a day, until further evaluation. In addition, daily cleansing with saline solution was recommended whenever necessary and the interval between eye drops was at least 10 minutes. Dexpanthenol should be administered last in the order of the medications. A half-moon shaped eye mask was also used to protect the area, and the treatment described was carried out on the farm.

After 14 days of initial care, the animal was re-evaluated and a worsening of the left eye was observed, with marked corneal edema (Figure 3), a positive fluorescein test and granulation tissue in the cornea. In the right eye, the fluorescein test was negative, but there was still marked corneal edema (Figure 4), increased granulation tissue and superficial blood vessels in the cornea. The result of the microbiological examination detected the presence of *Staphylococcus sp*.

Figure 3. Left eye, two weeks after initial treatment, marked corneal edema.

Source: Personal archive, 2024

Figure 4 - Right eye, fourteen days after initial treatment, persistence of corneal edema.

Source: Personal archive, 2024

In view of the condition, it was decided to continue using EDTA-Na2 in HA eye drops - cross-linked hyaluronic acid 0.75%, bilaterally, 1 drop, 5 times a day and Dexpanthenol one layer, bilaterally, but with a change to 5 times a day. New medications were introduced, such as: Moxifloxacin (Vigamox- Alcon®), 1 drop, 5 times a day, in the left eye and fetal bovine serum (Nova Biotecnologia®), 5 times a day.

One week after calving (26 days after initial care), entropion surgery was performed. The procedure was carried out with the animal on station and with the aid of a restraining trunk. Initially, the site was trichotomized, prior antisepsis with degerming chlorhexidine digluconate followed by an alcoholic chlorhexidine

digluconate solution, . Subsequently, infiltrative local anesthesia was performed on the skin and subcutaneous tissue with 2% lidocaine hydrochloride without vasoconstrictor (Xylestesin®), and definitive antisepsis.

The Hotz-Celsus technique was used bilaterally on the lower eyelid. The incision was made 1.5 cm (at its greatest angle) from the eyelid margin, followed by a second incision on the ventral margin in the shape of a half--moon. The distance between the incisions for the excision of skin tissue was approximately 1.5 cm (at its greatest angle). The edges were then sutured together with separate single stitches, using Polyglactin 910 (Vicryl®) 1 needle thread, and some stitches were interspersed with 0 needle nylon thread (Figure 5).

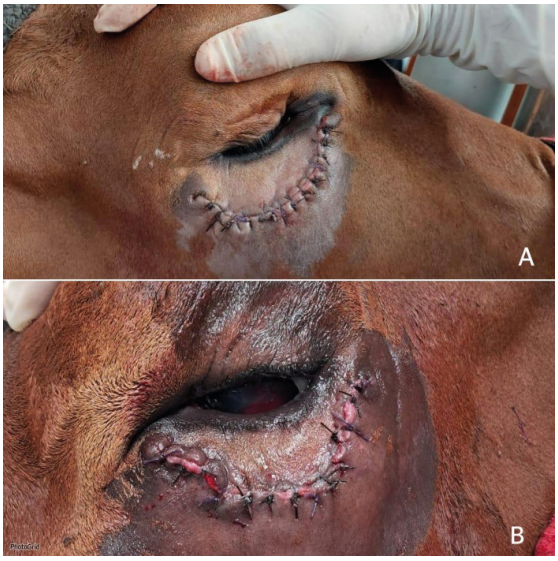

Figure 5: In A, immediate post-surgical right eye. In B, immediate post-surgical left eye.

Source: Personal archive, 2024.

Post-surgery, Dexamethasone (Dexaflan®), 16 mg/animal, was administered intramuscularly for two days. During the same period, Omeprazole (Gastrozol®) was also prescribed orally, SID. Both eyes were given retinol acetate, amino acids, methionine and chloramphenicol (Regencel®), Gentamicin, Hydrocortisone, Vitamin A, Vitamin D (keravit®), all four times a day at alternating times two hours apart. Applications of EDTA-Na2 eye drops X HA Cross-linked Hyaluronic Acid 0.75%, bilateral, 1 drop, 5 times a day and Dexpanthenol one layer, bilateral, 5 times a day were maintained, as well as fetal serum bovine 2 drops, bilateral, 4 times a day. The surgical wound was dressed with saline solution twice a day, lightly dried with gauze, followed by the administration of retinol acetate, amino acids, methionine and chloramphenicol (Regencel®). Two days after the surgery, the fungal culture result was positive. Immediately, ketoconazole-based eye drops were administered (manufactured in the institution's own laboratory), using two drops in each eye, three times a day. From then on, the frequency of antibiotic administration was reduced from four to two times a day. All the medications were indicated for interspersed use, respecting the schedule. The animal returned to the veterinary hospital to have the stitches removed 14 days after the entropion surgery (Figure 6).

Figure 6 - Images 11 days after starting antifungal therapy, OD: right eye and OE: left eye.

Source: Personal archive, 2024

After the stitches were removed, the use of Gentamicin, Hydrocortisone, Vitamin A, Vitamin D (Keravit®)was stopped and Dexamethasone, Neomycin Sulfate and Polymyxin B Sulfate (Maxitrol®) were administered two drops in each eye, 4 times a day in both eyes, the frequency of administration of retinol acetate, amino acids, methionine and chloramphenicol (Regencel®) was reduced to once a day, and the rest of the prescriptions were maintained. After 30 days of surgery, the use of fetal bovine serum was discontinued.

Thirty-four days after surgery, the medications began to be gradually reduced, with the administration of Dexamethasone, Neomycin Sulfate and Polymyxin B Sulfate (Maxitrol®) being reduced to 2 times a day, and the antifungal eye drops being reduced to 2 drops, bilaterally, 3 times a day, and the application of Retinol Acetate, Amino Acids, Methionine and Chloramphenicol (Regencel®) being maintained. Forty-eight days after surgery, dexamethasone, neomycin sulphate and polymyxin b sulphate (Maxitrol®) and the antifungal started to be used only once a day, for another 5 days, and the treatment ended (Figure 7).

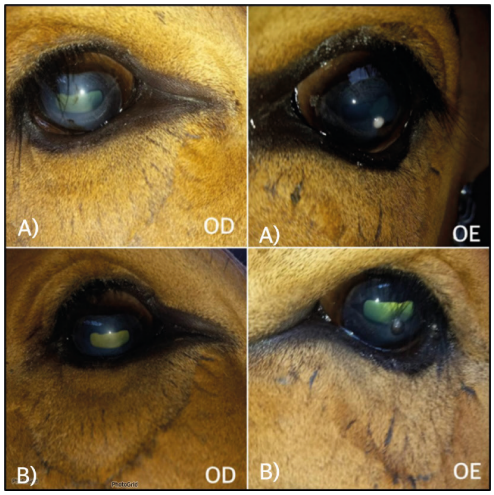

Figure 7. A) Images 16 days after the end of treatment.

B) Images 51 days after the end of treatment.

Source: Personal archive, 2024.

*Legend: OD: Right eye and OE: Left eye.

DISCUSSION

The literature describes that secondary entropion, also known as acquired or spastic entropion, most often occurs unilaterally and can affect both the upper and lower eyelids (BIDONE, N de B et al, 2011), but the present report describes the occurrence of bilateral spastic entropion.

In this case, difficulty in visual acuity was observed, which was also mentioned by Slatter (1998); Stades et al.(1999), yet Silva, A. C. E (2017) reports that entropion can trigger secondary infections by opportunistic microorganisms , which lead to corneal opacity, as observed in the present case. In addition, Ledbetter and Gilger, (2014) and Farghali et al., (2021) explain that opportunistic microorganisms such as bacteria, fungi and parasites feed on protein secretions from the eye, and that in addition to corneal opacity, they can also cause ulcers in this structure.

Fungi cause ophthalmic damage in animals. Scientific studies show that the presence of fungi in the conjunctiva is isolated more frequently in horses, rabbits and humans (BANDYOPADHYAY et al., 2012; BOURGUET et al., 2019; GE et al., 2019; KHOSRAVI et al., 2014). However, in the animal in this report, the presence of both microorganisms could be detected by fungal and bacterial culture. In cattle, fungal culture is more common in reproductive problems (GULL, T. 2023). The lack of clinical interventions and complementary diagnostic methods for ophthalmic lesions probably means that reports of ocular infections caused by fungi are scarce in this species.

The material was sent for culture and antibiogram only from the right eye, based on the changes observed on the day of collection, since only the right eye showed changes that indicated the examination. However, as time went by, the left eye began to worsen, so that the lesions observed resembled those initially

seen in the right eye. Considering that the animal was in the final stages of pregnancy and in order to minimize the stress of transport and collection, the decision was made to adopt the results of the initial microbiological examination, given the improvement shown, and also to replicate the treatment in the left eye.

The fluorescein test is the most suitable for detecting corneal epithelial rupture (CAPALDO and KOMÁROMY.,2006), and it is performed because of the ability of the fluorescein dye to be retained in the stroma, which is hydrophilic (MAGGS et al.,2008; DWYER., 2012). For this reason, this examination was carried out during the animal's first visit, making it possible to identify and determine the extent of the lesion, as well as the diagnosis of the corneal ulcer.

In this context, it was possible to determine bilateral superficial ulcerative keratitis and bilateral lower eyelid entropion. Some of the clinical manifestations such as blepharospasm, photophobia, epiphora, ocular discomfort, conjunctival hyperemia are due to corneal damage (MAGGS et al., 2017).

The implementation of fetal bovine serum in the treatment was based on its ability to stimulate growth factors, the presence of immunoglobulins, vitamins, bacteriostatic and anticollagenolytic substances, which help the healing of corneal ulcers, and these results are mentioned in the literature (SANTOS, D. M et al, 2012).

The results of the bacteriological examination showed that the microorganism was sensitive to fluoroquinolones, aminoglycosides (gentamicin) and some betalactams, so the use of moxifloxacin (Vigamox®) was initially instituted, and later we opted for the use of a commercial drug with drug associations including gentamicin, hydrocortisone, vitamin A, vitamin D (Keravit®).

The therapeutic management of corneal ulcers represents a significant clinical challenge, especially when considering the use of topical corticosteroids. These agents are widely recognized for their potent anti-inflammatory effects, which include inhibiting the infiltration of inflammatory cells, reducing edema and decreasing the release of pro-inflammatory mediators (Wilhelmus, 2002). Thus, the judicious use of corticosteroids can be beneficial in preventing scarring sequelae and preserving corneal transparency, particularly in advanced stages of stromal inflammation.

However, the use of topical corticosteroids in eyes with active corneal ulceration remains controversial. In particular, their indiscriminate use can compromise corneal re-epithelialization, slow down the healing process and suppress the local immune response, favoring the proliferation of pathogenic microorganisms (Srinivasan et al., 2012). However, in the present report, the use was judicious, the risks were weighed up and antimicrobial coverage was rigorously carried out on the basis of complementary tests.

Therefore, the decision to use topical corticosteroids should be based on a careful assessment of the etiology of the ulcer, the stage of the disease and the response to antimicrobial therapy. This case highlights the importance of an individualized approach, guided by laboratory tests, microbiological culture and close clinical follow-up.

The choice to carry out the clinical treatment on the farm was due to the animal's physiological condition, since any stress would be enough to affect the final gestational phase, which the animal was in. Furthermore, the entropion surgical procedure was not carried out immediately after the diagnosis of the eye condition, but rather one week after calving, in order to respect the cow's immune establishment and guarantee the transfer of immunoglobulins to the newborn (DONOVAN et al., 1986; BITTAR et al., 2018).

According to some authors Clarke; Spaldon, (1988); Gelatt, K. N.; Gelatt, J. P (1994); Steel et al, (1997); Hedlund, (2007), Pagliosa, G. M, (2021), non-surgical entropion treatments such as penicillin injections, mineral oil, botulinum toxin or paraffin can be used to cause temporary eyelid eversion. However, recent studies such as that by Gelatt, K.N., et al (2022), argue that penicillin injections are no longer indicated, and also dispute the use of liquid paraffin, claiming the risk of an inflammatory reaction to this substance. For this reason, none of these treatments were considered in this study.

Pagliosa, G. M, (2021) describes that for the entropion surgical procedure, the animal must be restrained with sedation or general anesthesia, in addition to local anesthesia. In this case, because the animal was docile and had halter restraint habits due to attending agricultural shows, it was not necessary to perform general anesthesia or sedation, so the animal was restrained in a restraint trunk and only local anesthesia was used, and the entire procedure was performed in a quadrupedal position.

According to the descriptions of the surgical procedure for entropion using the Hotz--Celsus technique, the dorsal incision should be parallel to 2 millimeters from the eyelid margin and the ventral incision should be on the anterior edge of the first incision, with the distance from one to the other being in accordance with the portion of skin that will be removed (PAGLIOSA, G. M, 2021). In the case presented, the distance between the incisions for the excision of skin tissue was approximately 1.5 centimeters, this delimitation respecting the need for the excision of skin to be removed to promote reversal.

A polyglactin 1 (Vicril) needle thread was used, but nylon 0 thread was interspersed at some points. The nylon thread was used to prevent the tension exerted by the Vicril thread from decreasing when considering possible environmental contamination, since the animal's post-operative period was in the field, on the property of origin.

The Holtz celsus surgical technique used for correction was considered quick and easy to perform, corroborating Sllatter (1998), who mentions the technique's efficiency.

The choice to use dexamethasone intramuscularly in the first two days after surgery was made in order to avoid edema in the peri-incisional region, since in low doses and at the time mentioned, there are no undesirable effects on the immune system resulting from the use of this drug (HUEZA. I.M., 2008).

Given the presence of a fungal agent shown in a specific culture, the indications in the literature by Gull, T. (2023) were followed, in which topical antifungal medication was included in the therapeutic protocol. Thus, ketoconazole-based eye drops were formulated in the institution's own laboratory. For this, a sterile ophthalmic solution based on dextran and hypromellose associated with 0.67% ketoconazole was used as the vehicle. Information on the use of antifungals in ophthalmology in cattle is scarce in the literature, so the choice of principle was based on reports by Nobre, M. O. et al (2002), who describes that ketoconazole has been used in veterinary medicine to treat various fungal infections.

A study by Maĭchuk, Lapshina and Diadina (1991) demonstrated the efficacy of ketoconazole in the treatment of mycotic eye diseases, using ophthalmic instillations. The authors reported low corneal toxicity and a good spectrum of action.

The use of fetal bovine serum for another 30 days after surgery was due to the availability of the medication on the farm in sufficient quantity for the period, and there are no contraindications given its beneficial properties for re-epithelialization in cases of corneal injury. In view of this, together with the other

medications and therapeutic protocols used, the result was positive, as the animal showed healing of the ulcer, improvement in the clinical condition and was discharged from hospital to return to normal routine activities on the farm.

CONCLUSION

This case highlights the importance of detailed ophthalmic assessment and early diagnosis in ocular disorders in cattle, especially in situations with multiple complications such as bilateral entropion, corneal ulcers and secondary bacterial and fungal infections. The association between entropion and corneal ulceration, added to opportunistic infection, reinforces the need for a broad therapeutic approach, integrating intensive clinical treatment and surgical correction. The Hotz-Celsus technique proved effective in resolving the entropion, and the use of complementary topical therapies, such as fetal bovine serum and antimicrobial and antifungal eye drops, favored recovery. The positive response to treatment shows that, even in complex cases, treatment based on complementary exams and well-structured protocols can preserve the animal's vision and well-being.

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