https://doi.org/10.21708/avb.2023.17.3.11717

Roberts-Bistner blepharoplasty for correction of bilateral eyelid agenesis in a cat

Blefaroplastia de Roberts-Bistner para correção de agenesia palpebral bilateral um gato

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ABSTRACT: Eyelid agenesis, also known as palpebral coloboma, is the most frequent congenital abnormality of feline´s eyelid compromising the patient's ocular health. The treatment of choice is blepharoplasty, which can be performed using different surgical techniques, depending on the extent of the coloboma. This paper reports a feline case diagnosed with coloboma in approximately 50% of the temporal and bilateral upper eyelid, which was treated using the Roberts-Bistner technique. Attention to the primary surgical care and delicate manipulation of tissues allowed maximum use of the wholly healed flaps. Trichiasis is a common complication inherent to traditional coloboma correction techniques and despite this was observed in both eyes a few weeks after surgery, the, reconstructive blepharoplasty provided adequate eyelid function and good cosmesis for the correction of eyelid agenesis in this patient.

KEYWORDS: Palpebral coloboma; Ophthalmic surgery; Myocutaneous flap; Trichiasis.

RESUMO: A agenesia palpebral, também conhecida como coloboma palpebral, é a alteração congênita mais frequente d a pálpebra dos felinos comprometendo a saúde ocular do paciente. O tratamento de escolha é a blefaroplastia, que pode ser realizada por meio de diferentes técnicas cirúrgicas, dependendo da extensão do coloboma. Este trabalho relata um caso felino com diagnóstico de coloboma em aproximadamente 50% da pálpebra superior temporal e bilateral, tratado pela técnica de Roberts-Bistner. A atenção aos cuidados cirúrgicos primários e a delicada manipulação dos tecidos permitiram o aproveitamento máximo dos retalhos totalmente cicatrizados. Triquíase é uma complicação comum inerente às técnicas tradicionais de correção do coloboma e, apesar de ter sido observada em ambos os olhos algumas semanas após a cirurgia, , a blefaroplastia reconstrutiva proporcionou função palpebral adequada e boa cosmética para a correção da agenesia palpebral nesse paciente.

PALAVRAS-CHAVE: Coloboma palpebral; Cirurgia oftálmica; Retalho miocutâneo; Triquíase.

INTRODUCTION

Eyelid defects can compromise ocular integrity, but they are rarely described in cats compared to dogs (Reed, Doering, Barrett, 2018). However, eyelid agenesis is considered the most common congenital eyelid defect in cats (Reed, Doering, Barrett, 2018; Bott; Chahory, 2022) and can lead to several consequences for the animal, ranging from pain and discomfort in the region to lesions in the conjunctiva and cornea, such as keratoconjunctivitis sicca and corneal ulcers, which may cause visual impairment (Van Der Woerdt, 2004; Etemadi et al., 2013; Reed, Doering, Barrett, 2018). Clinical treatment involves lubricating eye drops, but it proves to be long-term satisfactory only for lesions limited to a small eyelid region (Van Der Woerdt, 2004; Beel, 2015). Therefore, in most cases, it is necessary to approach the surgical treatment of blepharoplasty (Girond et al., 2021). Different techniques are described in the literature, and the choice depends mainly on the surgeon's experience, defect size, and probability of resolution. Such methods are intended to provide an outer layer of skin and an intermediate layer of muscle and support that are lined by an inner membrane to protect, moisten, and cover the cornea to provide a stable eyelid margin, preventing trichiasis and, if possible, maintain or restore the ability to blink (Mustarde, 1981; Whittaker et al., 2010). Among the various traditional blepharoplasty techniques reported for the correction of eyelid agenesis in cats, there is the Roberts-Bistner pedicled flap

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Received: 02/01/2023. Accepted: 08/28/2023

(Roberts; Bistner, 1968), the transposition of the labial commissure (Whittaker et al., 2010; Girond et al., 2021) and the crossed eyelid flap rotation technique using the Mustardé technique (Munger; Gourley, 1981) (Table 1). All these traditional blepharoplasty techniques provide functional results. Still, they may involve some postoperative complications, such as the occurrence of trichiasis due to hair growth in the flap, absence of the blinking reflex and the need for further surgical intervention(Whittaker , 2010).

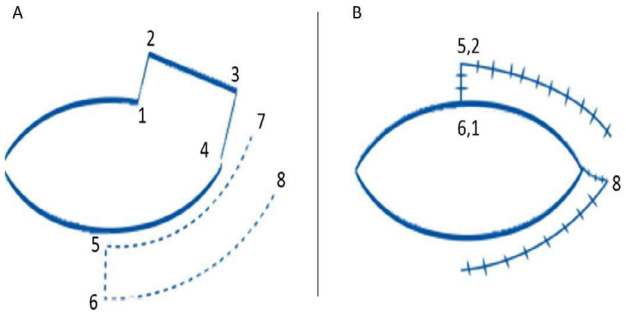
This paper aims to report a surgical clinical case in which the Roberts-Bistner reconstructive blepharoplasty technique was used to correct bilateral eyelid agenesis in a cat.

CASE REPORT

A mixed breed two years old female cat, with 3.8 kg, was attended with the main complaint of excessive tearing and a history of previous evaluations by other professionals. She was using ciprofloxacin eye drops daily, improving the ocular appearance and reducing excessive secretion. On clinical examination, vital parameters were within normal range, but it was also detected epiphora and aneyelid agenesis affecting approximately half of the bilateral temporal upper eyelid, with associated entropion and trichiasis (Figure 2A and B). It was prescribed to keep using ciprofloxacin eye drops 4 to 6 times a day but also Hyabak lubricating eye drops three times a day. Blepharoplasty surgery was indicated for surgical correction of bilateral palpebral agenesis. To perform the surgical procedure and subject the animal to anesthesia, hematological examination, cardiological evaluation, and electrocardiogram were performed and were unremarkable. Pre-anesthetic medication was administered intramuscullary and included methadone (Mytedom®) at a dose of 0.25mg/kg and dexmedetomidine (Dexdomitor®) at a dose of 3mcg/kg. Venous access was performed, followed by a wide trichotomy of the bilateral periocular region. As a prophylactic antibiotic, Cephalotin (Cefalotil®) was administered intravenously at a dose of 30mg/kg, 30 minutes before the start of surgery. Anesthetic induction was performed with ketamine (Cetamin®) at a dose of 1mg/kg and propofol (Propovan®) at a dose of 1mg/kg, both intravenously. After intubation, monitoring devices were placed, including Doppler, electrocardiogram, oximeter, and thermometer, and the animal was positioned in sternal decubitus and maintained in an anesthetic plane with isoflurane (Isoforine®). Continuous infusion of remifentanil (Remifas®) was performed at a rate of 10mcg/kg/h for pain control. Antisepsis was performed with topical PVPI (Povidone Iodine) diluted at 0.1% and the Roberts-Bistner technique (Figure 1) was used to correct the bilateral eyelid defect randomly starting with the left eye. The procedure began with a resection of the affected region (upper eyelid) to prepare for receiving the flap, using a #15 scalpel blade 2 mm from the eyelid margin. The size of the flap was measured to cover the entire defect, representing approximately 2/3 of the eyelid. The width of the flap was as wide as possible without causing lower ectropion, resulting in about 2 mm. The mucutaneous flap was carefully dissected with blunt scissors and ophthalmic forceps to preserve the orbicularis oculi and superior tarsal muscles and the subdermal plexus. After obtaining the flap, an anchorage point was made with 5-0 Polyglactin 910 thread (Vicryl®) and the flap was transposed to cover the defect on a layer of superior bulbar conjunctiva. The flap was sutured with the same thread and in a simple separate pattern. The same procedure was performed to correct the palpebral defect in the right eye.

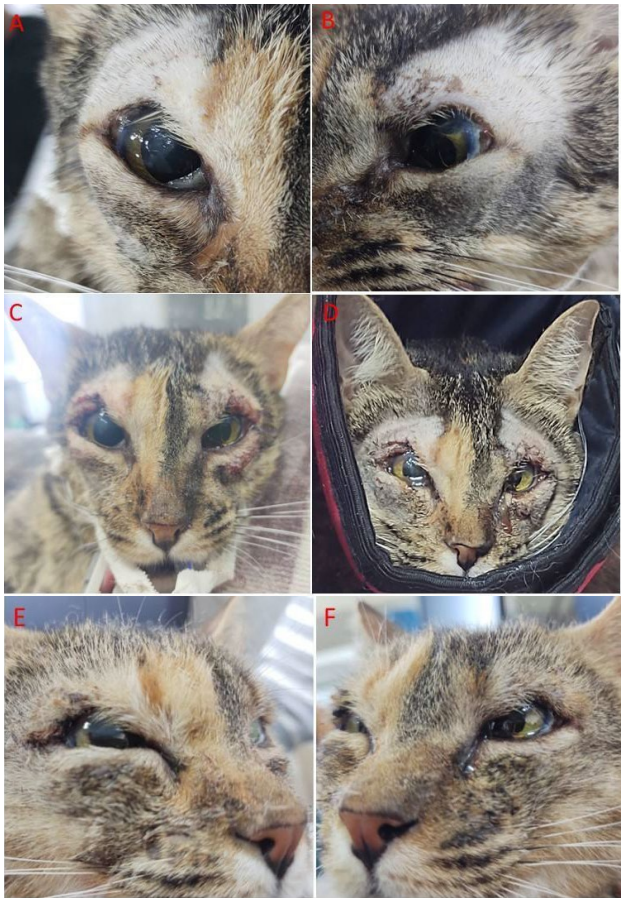
Table 1. Comparison of three traditional surgical techniques described in the correction of palpebral coloboma in felines (ROBERTS; BISTNER, 1968; WHITTAKER, 2010; BEEL, 2015).

	Transposition of the pedunculated eyelid flap (Roberts-Bistner technique)	Transposition of the commissure lip	Rotation of the crossed eyelid flap (Mustardè technique)
Description	Transposition of a mucutaneous flap from the lower eyelid through the lateral region of the eye to cover the upper eyelid defect	Transposition of labial commissure flap for repair of upper eyelid defect	1st Step: Creation of a full-thickness flap in the lower eyelid, followed by 180° rotation over the fault, preserving the lateral and medial corners. 2nd Step: after 2 weeks, section of the base of the Mustardé flap, rotation and suture of the medial border of the new upper eyelid.
Advantage	Single Step and less surgical trauma	Single Step and lower risk of trichiasis by allowing oral mucosa from oral commissure as eyelid margin.	Immediate protection of the lower eyelid flap to the cornea by keeping the eye closed during the two-week interval between surgical stages.
Disadvantage	Development of postoperative trichiasis.	Requires technical skill, more significant trauma and surgical time, and risk of parotid salivary duct injury during mucosal flap dissection	It requires 2 surgical stages, with an interval of 14 days between steps, and therefore, greater exposure/anesthetic risk, and development of postoperative trichiasis.



A: The receiving area is prepared after resection of the deformed eyelid segment, creating a defect (1-4). A mucutaneous flap (5-8) is prepared and incised long enough to cover the upper eyelid defect, starting from the lateral region of the lower eyelid, at a distance of 1-2 mm from the lower border and rotated along the ocular side to the defect. upper eyelid. B: The flap is transposed and then covers the upper eyelid defect and is sutured to the recipient bed and over the bulbar conjunctiva (5.2; 6.1) with 8-0 polyglactin absorbable thread in a separate simple pattern (DEMIR; SEVĠM KARAGÖZOĞLU , 2019).

Figure 1. Scheme demonstrating the Roberts-Bistner blepharoplasty(Adapted from BEEL, 2015).



A and B. Pre-operative showing bilateral upper temporal palpebral agenesis, with associated entropion and trichiasis, resulting in excessive tearing; C. Final aspect of the surgical wound (immediate postoperative period) after bilateral Roberts-Bistner blepharoplasty, in the immediate postoperative period; D. Surgical wound 10 days after blepharoplasty; E and F. Final result of correction of eyelid agenesis five weeks after surgery, already with new trichiasis observed in the right and left eyelids.

Figure 2. Mixed-breed, 2-year-old cat presenting with bilateral palpebral agenesis and submitted to the Roberts-Bistner blephatoplasty.

In the first 24 hours after surgery, the animal was hospitalized for pain control, receiving methadone (Mytedom®) (0.3mg/kg TID) and dipyrone (Dipifarma®) (25mg/kg SID), both subcutaneously, in addition to cephalothin (Cefalotil®) (30mg/kg BID) for intravenous antibiotic therapy. Eye drops based on moxifloxacin hydrochloride (Vigamox®) were used every 6 hours, and lubricating eye drops based on carboxymethylcellulose sodium (Lacri®) every 4 hours. The Elizabethan collar was placed right after the procedure to prevent the animal from interfering with the surgical wound (Figure 2B).

The cat was released on the day after the procedure (Figure 2D), with a prescription oforal administration of dipyrone (Dipyrone sodium®) at a dose of 25 mg/kg every 24 hours and tramadol hydrochloride (Cronidor®) in the dose of 2 mg/kg every 8 hours for five days, in addition to amoxicillin with potassium clavulanate (Agemoxi®), at a dose of 20 mg/kg every 12 hours for seven days. For topical use, eye drops based on sodium carboxymethylcellulose (Lacri®) and moxifloxacin hydrochloride (Vigamox®) were prescribed, with the same interval as during hospitalization.

A re-check was performed ten days after the surgery and there was no complications.. After five weeks of the procedure, the animal returned for reassessment and removal of the stitches. There was 100% of flap survival, the ocular appearance showed significant improvement, with adequate eyelid function and good cosmesis. Still, in a small area of the right and left eyes, trichiasis developed by the presence of hair in the skin flap transferred and maintaining contact with the cornea (Figure 2E and F), and a cryoepilation procedure was subsequently indicated for correction.

DISCUSSIONS

Eyelid agenesis is a congenital abnormality known as coloboma, whose main characteristic is partial or total suppression of the eyelid extensio(Warren, Grozdanic, Reinstein, 2020; Saraiva; Delgado, 2020). It can occur unilaterally or bilaterally and in the upper or lower eyelid. However, in cats, it usually affects the temporal upper eyelid and bilaterally, as observed in the patient in this report (Reed, Doering, Barrett, 2018; Warren, Grozdanic, Reinstein, 2020).

Palpebral coloboma is a common developmental anomaly in cats, which can lead to numerous ocular consequences (Saraiva; Delgado, 2020; Reed, Doering, Barrett, 2018). Structural failure of the eyelid leads to excessive evaporation and inadequate dispersion of the tear film, leading to chronic keratoconjunctivitis sicca, pain, and corneal ulcer. In addition, mechanical irritation of the facial hair, which comes into direct contact with the cornea (trichiasis) due to the absence of the eyelid, may occur (Van Der Woerdt, 2004; Labelle, 2017). Clinical signs depend on the extent of the eyelid defect and include intense discomfort, blepharospasm, epiphora, conjunctival and episcleral hyperemia and irregular corneal surface (Guerios et al., 2021). The changes observed in the

patient, such as ocular discomfort, excessive tearing, and trichiasis are consistent with what is described in the literature (Reed, Doering, Barrett, 2018; Guerios et al., 2021), but no changes were observed in the cornea, such as an irregular surface and ulcers. This may be related to the medical treatment performed since lubricating eye drops and other forms of ocular protection are recommended (Van Der Woerdt, 2004).

The diagnosis of eyelid coloboma is clinical and generally, the condition may be accompanied by other congenital abnormalities, such as microphthalmia, retinal dysplasia, optic nerve coloboma and dermoids (Maciel et al., 2016; Saraiva; Delgado, 2020). In the patient of this report, with the inspection of the eyelids during the physical examination, it was possible to observe an incomplete development of the bilateral eyelid, confirming the anomaly. However, the lack of a more detailed ophthalmological examination, including indirect ophthalmoscopy, precluded a more thorough investigation of other developmental abnormalities that could be associated with this condition (Stiles; Kimmitt, 2016). In the case of the patient in this report, the persistence of discomfort and the contact of the eyelashes with the cornea caused by the extension of the palpebral coloboma could injure and cause ulcers (Van Der Woerdt, 2004; Reed, Doering, Barrett, 2018) and therefore, surgical treatment was recommended to correct the defect, in addition to clinical treatment. The technique chosen for the procedure was the Roberts-Bistner technique, considering the lower degree of aggressiveness of the technique compared to other options (Whittaker, 2010; Beel, 2015; Demir; Sevgm Karagozoglu, 2019). This technique replaces the layers in a normal eyelid as much as possible. Typically, dog and cat eyelids are made up of four layers. In this way, there is a mucous membrane, called the conjunctiva, situated on the inner surface; a fibrous layer, called the tarsal plate, responsible for providing structural rigidity; a muscular layer, responsible for carrying out movements, such as blinking; and the skin, which is very thin and flexible (Van Der Woerdt, 2004). Using the Roberts-Bistner technique, a mucocutaneous pedicle is developed, containing skin and the orbicularis oculi and superior tarsal muscles, to be transplanted through the lateral eye to the palpebral defect. The transplanted musculature assists in the blinking reflex, which usually returns to normal, and modifications are made to the bulbar conjunctiva of the recipient area in an attempt to be included in the flap, thus forming an internal coating(Roberts; Bistner, 1968; VAN DER WOERDT, 2004). During the procedure, the flap was handled without trauma, using material that does not cause crushing.Scalpel was used for the incision and an anchorage point was applied to avoid using tweezers directly on the flap. Vessel hemostasis was performed with non-traumatic hemostatic clamps and careful ligation of the vessels to prevent the occurrence of postoperative hematoma and without using an electric scalpel to maintain local irrigation (Horta et al., 2015). Wound closure was performed with an atraumatic needle and in a simple separate pattern, which helps maintain local circulation, reducing the risks of ischemia and necrosis (Byrne; Aly, 2019). Furthermore, the patient received prophylactic antibiotic therapy before and after the procedure to reduce the risk of infection complications (Field et al., 2015). An Elizabethan collar was used until the stitches were removed (Guerios et al., 2021).

The technique allowed 100% survival of the flaps, demonstrating the importance of adopting the appropriate surgical approach and the surgeon's care during the procedure and carrying out a correct postoperative period. However, the development of trichiasis was noted in both eyes, as mentioned by Whittaker (2010) and Beel (2015), when using the Roberts-Bistner technique. Such complication could be resolved if the hair was excised with cryoepilation (Warren, Grozdanic, Reinstein, 2020). With the Roberts-Bistner technique, a mucocutaneous flap is created to the area of the eyelid defect, which should rest on the bulbar conjunctiva, serving as the innermost layer of this flap. Consequently, it may imply some degree of trichiasis (Van Der Woerdt, 2004). According to Reed, Doering, Barrett, (2018), when the connective tissue under the mucocutaneous flap suffers contraction, it can result in an inversion of the ventral margin of the flap, causing the hairs to make direct contact with the cornea, which could explain the observed trichiasis.

On the other hand, one of the advantages of the Roberts-Bistner technique is the fact that the technique is less complex and results in less surgical trauma when compared to other methods described, such as labial commissure, which consists of transposing a mucocutaneous flap from the oral cavity to correction of the eyelid defect (Guerios et al., 2021), resulting in more significative tissue manipulation, more surgical scarring and, consequently, may cause greater postoperative complications such as pain and deiscence (Whittaker, 2010; Demir; Sevgm Karagozoglu, 2019). In this same blepharoplasty technique, the occurrence of flap tip necrosis, trichiasis, suture dehiscence, and face distortion has already been reported, as observed by Maciel et al. (2016) and Guerios et al. (2021). Likewise, the Mustardè technique is also likely to result in trichiasis, requiring at least two surgical procedures, or more, to correct eyelid agenesis (Esson, 2001).

CONCLUSIONS

It is concluded that palpebral agenesis can cause numerous ocular consequences for the animal's vision, and, in most cases, it is necessary to adopt the surgical treatment of blepharoplasty. Roberts-Bistner blepharoplasty is a good alternative because it guarantees good ocular cosmesis and good eyelid function despite the risk of trichiasis, whose complication can be corrected by cryoepilation. This relatively simple eyelid reconstruction technique, associated with properly manipulating the tissues during its execution, ensures maximum flap survival to correct eyelid agenesis in cats.

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