Temporal horizontal H-figure sliding skin flap for central eyelid reconstructive surgery in dogs: a retrospective study.

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Published in:

Journal of Small Animal Practice

DOI: 10.1111/jsap.12761

Publication date:

2017

Document Version

Peer reviewed version (author's post-print)

Citation for published version:

Giordano, C., Vercelli, A., Barsotti, G. Temporal horizontal H-figure sliding skin flap for central eyelid reconstructive surgery in dogs: a retrospective study. (2017) *Journal of Small Animal Practice*, 58 (12), pp. 709-713. doi:10.1111/jsap.12761

Temporal horizontal H-figure sliding skin flap for central eyelid reconstructive surgery in dogs: a retrospective study.

Abstract

Objective: To describe a modified H-figure sliding skin flap for treating eyelid central neoplasms and to evaluate the cosmetic and functional results of this reconstructive blepharoplasty.

Methods: Eight dogs affected by eyelid neoplasia involving more than one-third of the central part of the margin underwent an *en bloc* rectangular surgical removal of the neoplasia. Reconstructive surgery was achieved using a temporal horizontal H-figure sliding skin flap.

Results: At short-term follow-up visits, 7 dogs showed no signs of ocular discomfort, whilst 1 exhibited mild blepharospasm and ocular discharge associated with partial necrosis of the flap. At the 60-day follow-up all dogs showed good eyelid margin reconstruction and no signs of lagophthalmos or ocular discomfort. Secondary trichiasis was observed in 1 dog.

Conclusions: The procedure allowed a well-positioned, fully mobile eyelid. The secondary trichiasis observed in 1 dog did not cause evident ocular discomfort at 6-month follow-up.

Key words: eyelid neoplasia**,** dog, blepharoplasty, advancement flap, secondary trichiasis

Introduction

Neoplasms of the eyelids are common in dogs, especially in older individuals. These neoplasms are mostly benign (Krehbiel & Langham 1975, Gwin *et al.* 1982, Roberts *et al.* 1986) and prognosis for survival and function after their complete surgical excision are excellent (Stades & van der Woerdt 2013). However, if the mass involves more than one-third of palpebral length or the neoplasm is malignant, reconstructive blepharoplasty using adjacent periocular tissues is advocated (Aquino 2007). In this case, the functional prognosis may be guarded because of possible alteration of the structure and function of the eyelid, which can predispose to lagophthalmos, corneal exposure, and trichiasis. (Aquino 2007). Local recurrence or distant metastases are possible if the neoplasm is malignant.

The most important goals of eyelid reconstructive surgery are to obtain a normal post-operative eyelid movement and a smooth, hairless, and well-positioned eyelid margin. Several techniques have been suggested in dogs and the most commonly used are those based on advancement or rotational flaps from the periocular region (Gelatt & Blogg 1969, Blanchard & Keller 1976, Bistner *et al.* 1977, Pellicane *et al.* 1994, Lewin 2003). Other more challenging procedures that involve the opposite eyelid (Mustardé 1966, Munger & Gourley, 1981, Aquino 2007) and the buccal (Pavletic *et al.* 1982) or head (Jacobi *et al.* 2008) regions have been also reported.

The aim of this study was to describe the technique and outcome of an alternative eyelid reconstructive surgery in dogs, based on a temporal horizontal H-figure sliding skin flap in the case of neoplasms involving the central part of the eyelids in 8 dogs.

Materials and methods

Cases were derived retrospectively from the caseload presented during a 24-month period, during which a total of 10 suitable candidates were identified, of which 2 did not have sufficient follow-up information to be included in this report. The main inclusion criteria were diagnosis of a benign eyelid neoplasia in the central part of either upper or lower eyelid involving more than one-third of the palpebral extension, and at least 2 follow-up visits, the first at ~2 weeks, and the second ~60 days post-operatively. Pre-operative ocular assessment consisted of slit-lamp biomicroscopy of adnexa and anterior segment of the eyes. In addition, Schirmer tear test and rebound tonometry were performed in each animal. All dogs underwent a pre-anesthesia examination, including cardiological and haemato-biochemical assessment. Furthermore, abdominal ultrasonography and thoracic radiographs were performed.

At time of surgery dogs placed in lateral recumbency with the affected eyelid up and the whole upper or lower eyelid and temporal region was clipped and aseptically prepared. Marbofloxacin 2 mg/kg IM (Marbocyl FD, ATI, Italy) was administered 30 minutes before induction of general anesthesia. A full thickness, *en bloc* resection, including at least 1 mm of normal-appearing lid tissue was made. Two horizontal, parallel or slightly divergent skin incisions were continued from the lateral part of the defect. The dorsal horizontal incision was extended for approximately double the length of the defect; the ventral incision included the lateral canthus and ended laterally, corresponding with the end of the first incision. Two Burrow skin triangles were also prepared at the external end of each skin incision (Fig 1a). The flap was obtained by separating the deeper layers of the *orbicularis oculi* muscle and the subcutis of the temporal region from the skin by blunt and sharp dissection. After the excision of the 2 Burrow skin triangles, the temporal part of the unaffected eyelid margin and the periocular skin were slid medially to fill the gap created by the *en bloc* excision (Fig 1b). The deep aspect of the skin flap was lined with conjunctival tissue obtained from adjacent areas in all cases. The transposed conjunctiva was sutured in place using a simple interrupted pattern with buried knots, using 7-0 absorbable monofilament sutures (PGA, FSSB Chirurgische Naden GMBH, Germany). A standard 2-layer technique was then used to close the eyelid wound. The

conjunctival layer was closed first with 6-0 absorbable suture in a simple continuous pattern (PGA, FSSB Chirurgische Naden GMBH, Germany). A figure-of-8-like stitch was placed to accurately reconstruct the new eyelid margin and the lateral canthus. Then, the flap was secured by another 5 simple stitches (Fig 1c), and the remaining skin of the eyelid and periocular region was subsequently closed in a simple interrupted pattern with sutures placed approximately 2mm apart along the incisional lines. For suturing, 5-0 Poliglecaprone 25 (Monocryl, Ethicon, USA) was always used. The same technique, but upside down, was executed in the case of the eyelid neoplasia located in the central part of the lower eyelid. All dogs were discharged wearing an Elizabethan collar. Post-operative treatments consisted of chloramphenicol, colistimethate sodium and rolitetracycline ophthalmic ointment (Colbiocin ointment, SIFI, Italy) every 8 hours for 7-10 days, marbofloxacin 2 mg/kg once daily PO (Marbocyl P, ATI, Italy) for 6 days and carprofen 2 mg/kg once daily PO (Rimadyl, Pfizer Italia, Italy) for 7 days post-operatively. All owners were instructed to keep the surgical wound clean using gauze soaked in 0.9% saline solution once a day for the first 3-4 days post-operatively.

Results

The procedure was carried out on 3 mixed-breed and 5 pure-breed dogs (2 English cocker spaniels, 1 shih-tzu, 1 miniature schnauzer, and 1 beagle). There were 5 males and 3 females with an average age of 10.6 years (range 8-13 years). Seven treated neoplasms were located in the central part of the upper eyelid, whereas only 1 involved the lower eyelid. No severe systemic diseases were identified during the pre-surgical assessment and all dogs recovered from surgical procedure and anesthesia without complication. Histopathological examination of the excised masses confirmed the initial clinical diagnosis of benign palpebral neoplasms; in each case the diagnosis was either adenoma or sebaceous epithelioma.

At the first follow-up visit, all dogs, with the exception of the shih-tzu, showed mild-to-moderate palpebral and conjunctival swelling. However, no signs of skin flap retraction, local infection nor ocular discomfort were noticed. In the shih-tzu there was moderate inflammation of the surgical wound and an area of superficial necrosis of the transposed skin flap, along the

eyelid margin, was observed. There was also partial wound dehiscence of the nasal part of the flap. Both topical and systemic antibiotic therapy was continued in this dog and an omega-3/omega-6 fatty-acid ophthalmic ointment (Omegalid, NBF, Italy) was prescribed to be applied every 12 hours. The dog was re-examined 21 days after surgery when it showed improvement of the condition of the sliding skin flap. At the 28-day follow-up, healing of the flap was complete. At the last follow-up visit – at ~60 days post-operatively - all dogs showed a satisfactory functional and cosmetic anatomical lining of the eyelid edge. Three dogs out of 8, including the shih-tzu, showed mild perilimbal temporal corneal pigmentation without any signs of active keratitis. There was secondary trichiasis in one case (the shih-tzu), but this did not appear to be causing ocular discomfort. A thorough examination of the shih-tzu dog 6-months after surgery confirmed that, although lateral trichiasis persisted, there were no signs of ocular discomfort and the corneal pigmentation was unchanged.

The cases of the shih-tzu and 1 of the two English cocker spaniels are reported in Figure 2 and 3, respectively.

Discussion

Usually, the neoplasms of the type treated in this report require *en bloc* resection, creating a large defect that cannot be restored by simple direct closure (Aquino 2007). For centrally located eyelid neoplasms, 1 of the most straightforward procedures is the H-plasty or vertical sliding skin flap technique by which skin and limited depths of the *orbicularis oculi* muscle adjacent to the defect are used to replace the missing eyelid margins of either the upper or lower eyelid. Conjunctival transposition is needed to complete the procedure (Bistner *et al.* 1977*)*. However, this vertical H-plasty, although easy to perform and generally effective, has the disadvantage of leading to a new, centrally-scarred, lid margin. Moreover, additional procedures may be required if trichiasis leads to chronic corneal irritation which, in turn, can cause corneal vascularisation, pigmentation and ulceration. These complications might compromise vision in severe cases.

Other 1-stage reconstructive techniques that can be used in case of centrally located eyelid

neoplasms are the semicircular flap and the split eyelid flap. The former technique was described by Pellicane *et al.* (1994), and consists of a rotational sliding flap liberated from the lateral periocular region, involving the lateral canthus. This procedure seems to be effective for treating large eyelid neoplasms, and creates a smooth, hairless margin in place of the affected eyelid. However, in the series of 5 dogs we have previously described, 2 cases of trichiasis and 1 case of eyelid retraction were encountered (Pellicane *et al.* 1994).

In our case series, eyelid reconstruction was achieved by modifying the vertical H-plasty, as described above, into a horizontal H-plasty, and the sliding flap obtained from the lateral skin was shifted medially. The normal eyelid margin lateral to the neoplasia was used to fill the defect, thus restoring the central part of the eyelid with autologous anatomically hairless eyelid margin. The skin part of the transposed flap created the new lateral scarred third of the lid margin.

The advantage of our technique is that it maximises the amount of normal eyelid margin positioned over the central cornea; the new scarred lid margin is laterally positioned and in case of hair growth, it would be less irritating than if it were on the cornea centrally, as can may occur in the vertical H-plasty sliding skin flap technique. The only short-term complication encountered was a partial necrosis of the flap in the shih-tzu dog. The necrosis involved the superficial part of the flap, it probably was ischaemic in origin, and seemed to be caused by excessive post-surgical tension of the slid skin. The necrosis was successfully treated with medical therapy and did not cause significant alteration of the lid margin. At 60-day follow-up the same dog showed temporal secondary trichiasis without signs of ocular discomfort. The trichiasis touched the dorsolateral bulbar conjunctiva, also reaching the cornea. A perilimbal lateral corneal pigmentation was evidenced on that occasion. The pigmentation was attributed to the trichiasis, as well as to a post-surgical slight augmentation of the lateral part of the palpebral fissure which had caused a major exposition of the eye in an already breed–related exophthalmic dog. This dog was subsequently re-examined 6 months post-operatively and the treated eye appeared comfortable. The corneal pigmentation had not changed and had

remained laterally located without involving the visual axis, as can happen, instead, in the standard vertical H-figure procedure. Mild temporal corneal pigmentation was observed in 2 other treated dogs, and this occurrence was attributed to the new, scarred, lateral third of the lid margin, causing a modified interface between the palpebral skin and the cornea.

Only 1 dog operated using this technique had neoplasia of the lower eyelid. Also in this case, the procedure was effective and no signs of ocular discomfort, secondary trichiasis or corneal pigmentation were observed at the last follow-up examination. In the case of central neoplasms of the lower eyelid, the same techniques described for the upper eyelid can be used with variable results (Bistner *et al.* 1977, Pellicane *et al.* 1994, Lewin 2003). When a large neoplasm involving the most part of the lower eyelid is present, a 1-stage surgical procedure could be the rotational flap using the dog's upper lid (Pavletic *et al.* 1982).

To conclude, on the basis of our results, the temporal horizontal H-plasty sliding skin flap is an effective surgical technique in the case of centrally-located eyelid neoplasms. The technique is a simple, relatively quick, 1-stage procedure that leads to a scarred new margin located peripherally, thus avoiding secondary keratitis involving the visual axis. Complications arising from the procedure appear to be very limited.

Conflict of Interest

None of the authors of this article has a financial or personal relationship with other people or organisations that could inappropriately influence or bias the content of the paper.

Acknowledgement

This manuscript is dedicated to the memory of Dr Paola Giubbilei, who made the important contribution of drawing the surgical technique schematics

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Figure captions

Figure 1a. The red dashed lines show the incisions necessary to perform the temporal horizontal sliding procedure. The dorsal horizontal incision, BC, should be approximately double the length of the defect AB; the ventral incision, FG, starts from the lateral cantus, extends parallel to the first incision BC, and stops exactly under C.

Fig 1b. This drawing shows the lateral periocular region (yellow) prepared to be slid. The curved red line shows the temporal eyelid margin that will be moved medially for the reconstruction of the central part of the lid margin. The two grey triangles indicate that the skin has already been removed at this level.

Fig 2c. The flap has been moved medially into the wound, and the central part of lid margin has been re-created. The numbers indicate the sequence of the placement of the most important sutures, which have the function of securing the flap in place.

Figure 2a. Pre-operative assessment of the temporal horizontal sliding procedure in an 8-year old shih-tzu dog affected by a neoplastic mass of the upper eyelid in the right eye. The surgical incisions are marked with a dermographic pen.

Figure 2b. Immediate, post-operative appearance of the shih-tzu dog of Figure 1a. The lateral part of the normal eyelid margin was slid to the central position, in the site of the removed neoplasia.

Figure 2c. Fourteenth-day follow-up examination of the shih-tzu dog. The necrosis of the superficial part of the flap and the partial wound dehiscence of the nasal margin of the suture are evident. No signs of keratitis are present.

Figure 2d. Day 60 follow-up examination of the dog in Figure 1a. The flap healed completely. Superotemporal trichiasis, associated with peripheral corneal pigmentation at the same level, is evident.

Figure 3a. Aspect of one of the treated neoplasia of the left upper eyelid in a 12-year old English cocker spaniel at presentation. The neoplasia involves more than one-third of the eyelid.

Figure 3b. Day 14 follow-up examination. To be noted that no particular complications are present. The dog only shows moderate signs of inflammation at the level of the knot in the lateral cantus.

Figure 3c. Day 60 follow-up. No signs of trichiasis or corneal pigmentation are evident in this case. The normal slid eyelid margin is located over the central cornea and the new scarred lid margin is laterally positioned.