

Simplified medial canthoplasty: Technique and early postoperative complications in 601 dogs (1180 eyes)

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Abstract

Purpose: To present a novel modified medial canthoplasty (MCP) technique, the application in 601 dogs (1180 eyes), and a review of the early postoperative complications related to the technique.

Introduction: Macropalpebral and nasal entropion is a common presentation in many brachycephalic dog breeds promoting chronic keratitis. The previously described MCP techniques limit the medial shortening of the eyelids to the location of the lacrimal puncta. A novel technique was developed allowing for a more extensive eyelid shortening nasally.

Methods: The modification of the here described technique includes the longitudinal splitting of the lacrimal canaliculi allowing for an extensive shortening of the lids beyond the lacrimal puncta. Records of 601 dogs which underwent the modified MCP were reviewed regarding breed, indications for surgery, follow-up, and early postoperative surgical complications. Descriptive statistics were applied.

Results: Six hundred one dogs (1180 eyes) were included in this study. Twenty-four different breeds underwent the simplified MCP with the Pug ($n = 403$) being the most represented breed. Indications were macropalpebral fissure, medial entropion, pigmentary keratitis, trichiasis by haired caruncle, strabismus after globe prolapse, and facial nerve paralysis. The overall complication rate was 1.01% (12/1180) and consisted of wound dehiscence 0.59% (7/1180), corneal ulceration caused by suture material 0.25% (3/1180), and wound infection (2/1180). None of the 601 operated dogs developed serious complications related to the surgical technique.

Conclusions: The simplified MCP is a novel technique with a very low complication rate.

KEYWORDS

brachycephalics, macropalpebral fissure, medial entropion, trichiasis

1 | INTRODUCTION

Medial canthoplasty (MCP) is a surgical technique for the reduction of the length of the eyelid fissure and the elimination of caruncle and medial trichiasis. Indications include macroblepharon/macropalpebral fissure, lagophthalmos, exposure keratitis, pigmentary keratitis in pugs and other brachycephalic breeds, reduction of risk of proptosis or globe prolapse, and correction of medial and caruncle trichiasis.¹

In the literature, reports on MCP are sparse. The original Roberts-Jensen-Pocket-procedure¹ as well as modifications²⁻⁸ limit the extent of shortening of the eyelids to the position of the lacrimal puncta and canaliculi. Regarding the treatment of caruncular trichiasis, one report described a thermotherapy method to treat the trichiasis as well as the entropion but does not address the macroblepharon.⁹ Likewise, cryotherapy has been described for caruncular trichiasis without correction of macroblepharon.^{10,11} However, the majority of the brachycephalic breeds need an extensive reduction of the eyelid length to effectively treat ocular surface disease (exposure keratitis and corneal pigmentation) caused by macropalpebral fissure. In pugs, pigmentary keratitis is significantly associated with medial (nasal) entropion.¹²

As pugs exhibit the combination of macroblepharon and medial entropion, a simplified MCP technique was developed to shorten the eyelid fissure far beyond the lacrimal puncta along with the correction of the medial entropion.¹³ This technique is described subsequently.

2 | MATERIALS AND METHODS

2.1 | Surgical procedure

In short, after longitudinal splitting of the lacrimal canaliculi and excision of a rhomboid part of the medial canthus, the medial entropion may be corrected while incorporating the closure into the closure of the nasal wound. The most important difference of the technique described here when compared to previously described techniques is the splitting of the canaliculi allowing for drastic reduction of the lid fissure length as well as the simplified closure of the wounds.

The following surgical instruments are needed:

Eyelid speculum (author's preference: Williams lid speculum), Graefe forceps with lock, scalpel blade holder, and scalpel blade number 15, fine surgical forceps with tying plates (i.e., Castroviejo suture forceps with 1×2 teeth 0.3 mm), Stevens tenotomy scissors, fine straight suture scissors, and Backhaus tissue clamps.

The simplified MCP technique is carried out under general anesthesia. Intravenous induction is followed by intubation and inhalation anesthesia. MCP is preferably performed under the operating microscope at a magnification of about 5×. The dog is positioned in lateral recumbency with the nose pointing toward the end of the table. Head and neck are placed in a vacuum cushion. The head is rotated slightly upward so that the medial canthus is in a horizontal plane.

The surgical area is prepared in a standard eyelid surgery fashion. Several drops of epinephrine 10% may be instilled onto the conjunctiva for vascular constriction. The eyelid speculum is placed. The nictitans is pulled across the globe using a Graefe forceps which is then fixed to the skin with a Backhaus tissue clamp for maximal exposure of the medial canthal area (Figure 1A). Two pieces of a colored 2-0 monofilament suture material of about 2 cm length are inserted into the lacrimal canaliculi for visualization (Figure 1A). The pieces of monofilament suture material are removed after canalicular splitting (Figure 1D).

An initial oval incision is made in the conjunctiva with a Stevens tenotomy scissors starting at the site of the caruncle on the third eyelid (Figure 1C). The caruncle and hair follicles are undermined and resected (see Videos 1 and 2).

One blade of a scissors is introduced into the lacrimal canaliculi and the canaliculi are split longitudinally (Figure 1D-F). By splitting the canaliculi, the lacrimal puncta are translocated deep into the conjunctival fornix. Care should be taken to avoid grasping the conjunctiva adjacent to the canaliculi with the forceps. During the entire procedure conjunctiva is grasped only where it is going to be excised, the remaining conjunctiva must not be traumatized with the forceps. With this procedure, the placement of an indwelling catheters is not necessary. Basically, a fistula with mucosal lining is created that leads into the lacrimal sac. Therefore, the translocated puncta will remain open. For further clarification of the position and appearance of the translocated puncta, see Figure 2 and Videos 1 and 2.

After sharp dissection of the conjunctiva along the canaliculi, the medial palpebral ligament is dissected. The conjunctiva is then further dissected parallel to the lid margin up to the point where the lid margin is sharply cut with the scalpel blade. The cuts of the lid margin are 45° oblique allowing a more anatomical reconstruction of the medial canthus (see Videos 1 and 2). The width of the rhomboid excision determines the reduction of the lid fissure length (Figure 1B). The extent of the shortening of the eyelid length is estimated in the awake animal prior to surgery. Shortening may be over 30% of the eyelid length.

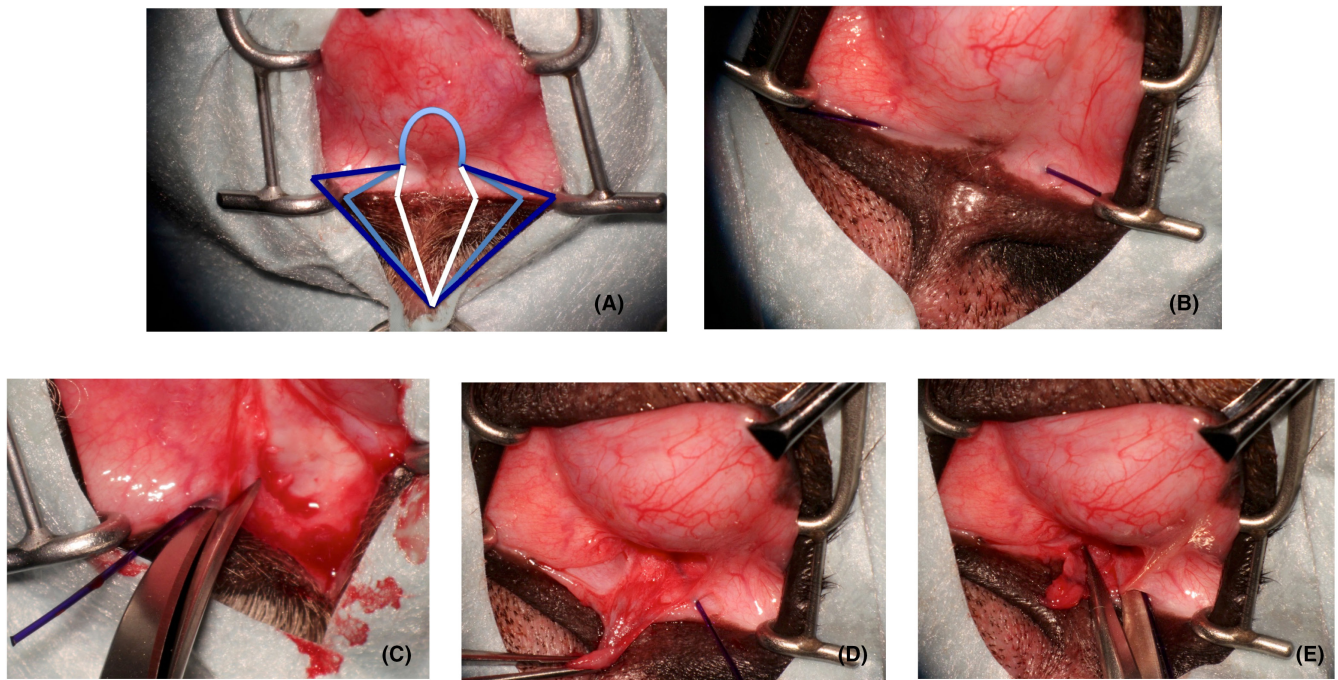


FIGURE 1 Surgical procedure: View through the operating microscope at about 5× magnification. (A) The lid speculum is in place and the nictitans is pulled across the globe with a Graefe forceps. Pieces of a colored suture (about 2 cm length) material are placed in both canaliculi for orientation. Blue arrows indicate their direction. (B) The colored lines show the possible extent of the area of the medial canthus that might be excised. *Note:* Shortening of the eyelid length may be far beyond the lacrimal punctum. (C) Preparation of the conjunctiva starting with Stevens tenotomy scissors just proximal to the haired caruncle. The initial incision follows a semicircular line (marked in blue). (C-E) By splitting the canaliculi longitudinally, the lacrimal puncta are transposed deep into the fornix.

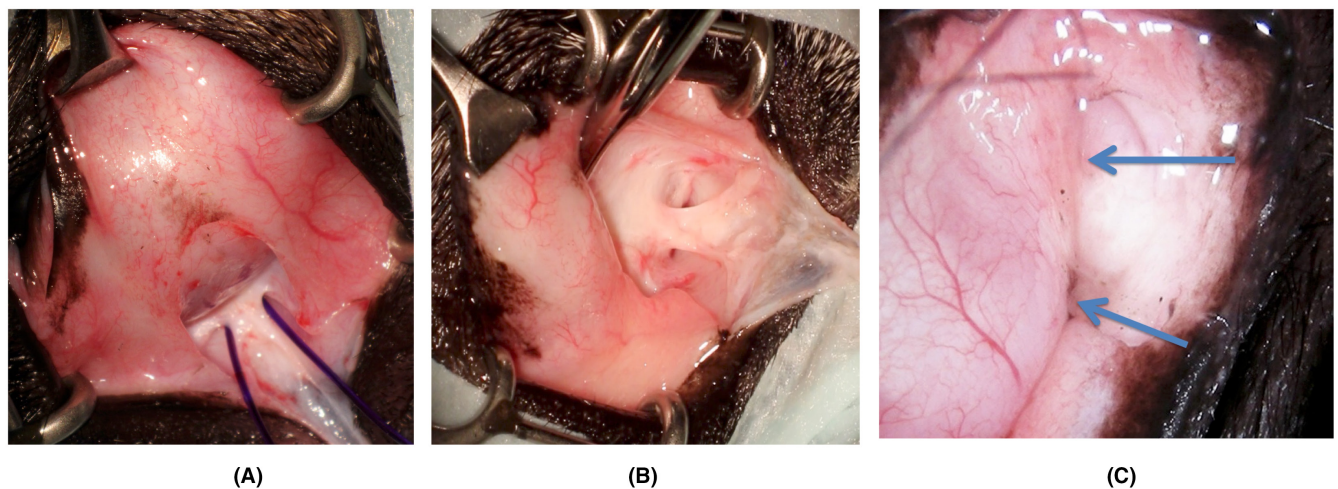


FIGURE 2 Further clarification of the effect of the simplified MCP on the lacrimal canaliculi and lacrimal puncta: (A, B) Intraoperative pictures. (A) The canaliculi are split longitudinally thereby transposing the openings to the lacrimal drainage system deep into the conjunctival fornix. The colored suture material inserted for visualization during surgery is in place. (B) The colored suture material has been removed. The transposed lacrimal puncta are widely open giving access to the lacrimal sac. (C) Photo of the lacrimal puncta of a Shih Tzu dog several years after simplified MCP. The nictitans is pulled across the globe and the medial canthus is stretched nasally for visualization of the lacrimal puncta. The caruncle has been removed and the medial palpebral ligament transected during surgery. Therefore, a flat and even area of conjunctiva is seen adjacent to the medial canthus extending to the lacrimal puncta located deep in the fornix. The transposed lacrimal puncta/conjunctival openings are widely open toward the lacrimal drainage system (marked with blue arrows).

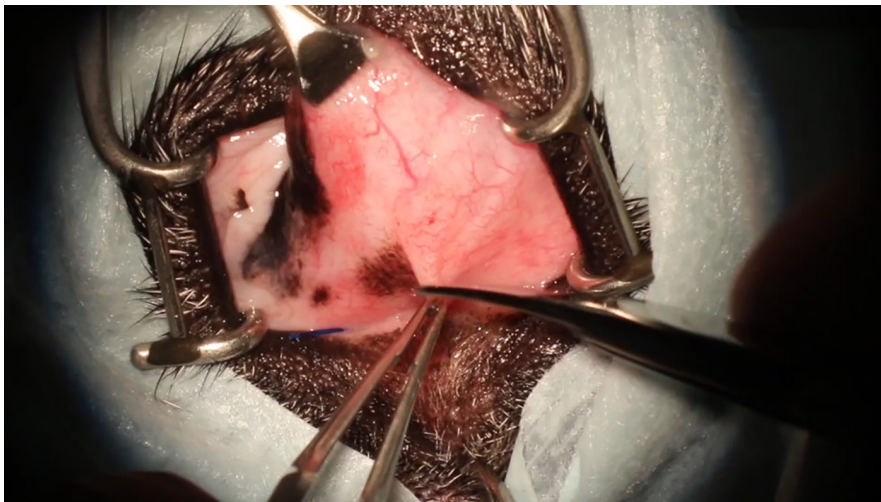
A Stevens tenotomy scissors is used to remove the conjunctiva and skin in a rhomboid pattern in the nasal direction (Videos 1 and 2).

Several interrupted sutures or one deep x-suture (cruciate or Sultan) and a single interrupted suture close to the lid margin are placed with resorbable suture material (Vicryl® 6-0, Ethicon, Johnson & Johnson Surgical Technologies) to appose the wound (Videos 1 and 2). A figure-8-suture closes the lid margin. The knots as well as the suture ends point toward the skin to avoid contact of suture material with the cornea (Figure 3).

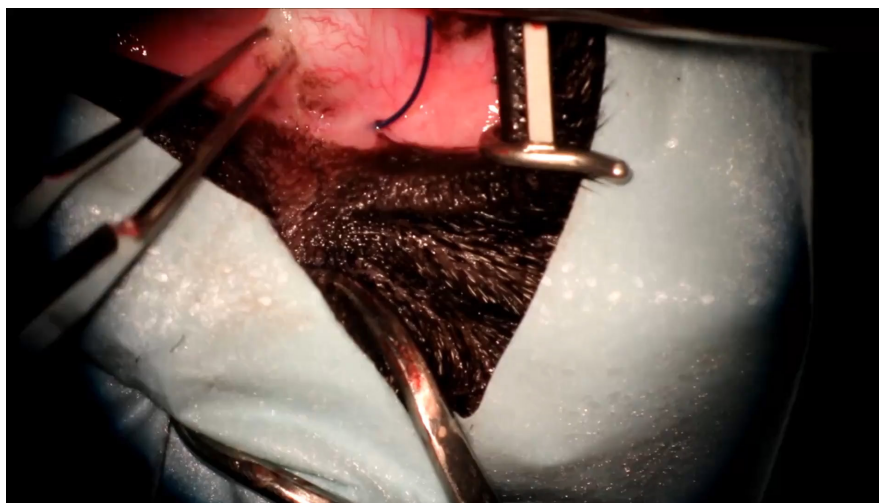
If needed, the medial entropion of the lower eyelid is subsequently corrected. Excessive skin is excised with Stevens tenotomy scissors in a semilunar shape. The size (width and length) of the resected skin is adapted to the

individual needs. Depending on the dog, the excision may extend toward the upper lid. The wound is closed with single interrupted sutures and one mattress suture at the meeting point of both wounds (Figure 4). The suture ends of the figure-8-suture are included into the aside knot to prevent corneal contact. All other suture ends are cut short (about 2mm). The author's preferred suture material for all abovementioned sutures is Vicryl® 6-0 (Ethicon, Johnson & Johnson Surgical Technologies) with a cutting needle.

Postoperatively, an Elizabethan collar is applied. Aftercare includes an oral nonsteroidal anti-inflammatory drug (i.e., carprofen, meloxicam, or other) for 7 days as well as careful cleaning of the wound if necessary. The sutures are removed about 2 weeks after surgery. The Videos 1 and 2 further demonstrate the surgery.



VIDEO 1 Modified medial canthoplasty in a Pug. The dog is positioned in lateral recumbency with the head slightly tilted and the nose pointing towards the surgeon at the end of the table. The surgery is performed under the surgical microscope with a magnification of about 5x. The lid speculum is spread and the nictitans is pulled up across the globe with a Graefes forceps. Pieces of colored suture material (about two cm long) are inserted into the upper and the lower lacrimal canaliculi.



VIDEO 2 The initial cut is performed with Stevens tenotomy scissors excising the haired caruncle. Further dissection is along the lacrimal canaliculi which are subsequently split longitudinally. The lid margins are incised with a number 15 scalpel blade. The rhomboid piece of skin, lid margin and conjunctiva is excised with Stevens tenotomy scissors. Care is taken not to damage the remaining conjunctiva. The wound is closed in two layers (subcutaneous, cutaneous) while the conjunctiva is not sutured. The lid margin is adapted with a figure-8-suture. The medial entropion is corrected with a half-moon shaped resection of the abundant skin nasally.

2.2 | Retrospective evaluation

A retrospective evaluation (2000–2023) of dogs that underwent the simplified MCP as described above was performed. Inclusion criterion for the retrospective evaluation was a follow-up time of at least 2 weeks after MCP in order to pick up the early postoperative complications related to the technique. All dogs underwent a complete ophthalmic examination including slit lamp biomicroscopy and fluorescein staining. In one case, bacterial culture of the wound secretion was performed. Breed, indication for surgery, time till final follow-up examination, postsurgical complications as well as bacterial culture results were noted. Microsoft Excel descriptive statistics were applied.

This study complies with the Guidelines for Ethical Research in Veterinary Ophthalmology (GERVO) and is approved by the responsible authority (Landesamt für Gesundheit und Soziales, Berlin, Germany) under the registration number StN° 040-2023. Animal owners or owners' representatives provided written consent for the planned treatment provided, and for the use of anonymized data for scientific purposes as well as usage of photographic material.

3 | RESULTS

Six hundred one dogs (1180 eyes) met the inclusion criteria. In total, 579 dogs were operated bilaterally and 22 dogs unilaterally as either the contralateral eye was enucleated

(21) or the indication for MCP was unilateral facial nerve paralysis (1).

The breeds most represented are Pug (403), Shih Tzu dog (76), Pekingese dog (24), French Bulldog (16), Maltese dog (13), Poodle (10), Bolonka Zwetna (9), and Bichon Frise (7), followed by small cross-breeds (7), Havanese dog (5), Cavalier King Charles Spaniel (4), Lhasa Apso (4), Bolognese dog (4), Yorkshire Terrier (4), Chihuahua (3), Pomeranian (2), Jack Russel Terrier (2), Boston Terrier (2), Tibet Spaniel (2), Japan Chin (1), Coton de Tulear (1), Chinese Crested (1), and West Highland White Terrier (1).

Indications for the surgery were macropalpebral fissure/macrolepharon (540), medial entropion (532), pigmentary keratitis (441), medial trichiasis/haired caruncle (176), situation after globe prolapse with divergent strabismus (17), and facial nerve paralysis (1). The breeds operated for caruncular trichiasis only were Havanese dog, Jack Russel Terrier, Maltese dog, Bichon Frise, Chinese Crested dog, Bolonka Zwetna, Bolognese dog, Chihuahua, Yorkshire Terrier, Poodle, and small cross-breeds. The median follow-up time was 15 months (0.5–185 months). At the time of suture removal, the eyelid conformation was considered favorable in all 601 dogs. In dogs operated for macrolepharon and nasal entropion, the postoperative palpebral fissure size showed less conjunctival and corneal exposure compared to prior to surgery (Figure 4). Epiphora was not present in those dogs. In cases with haired caruncles, the epiphora was greatly reduced (Figures 5 and 6). The postoperative complications

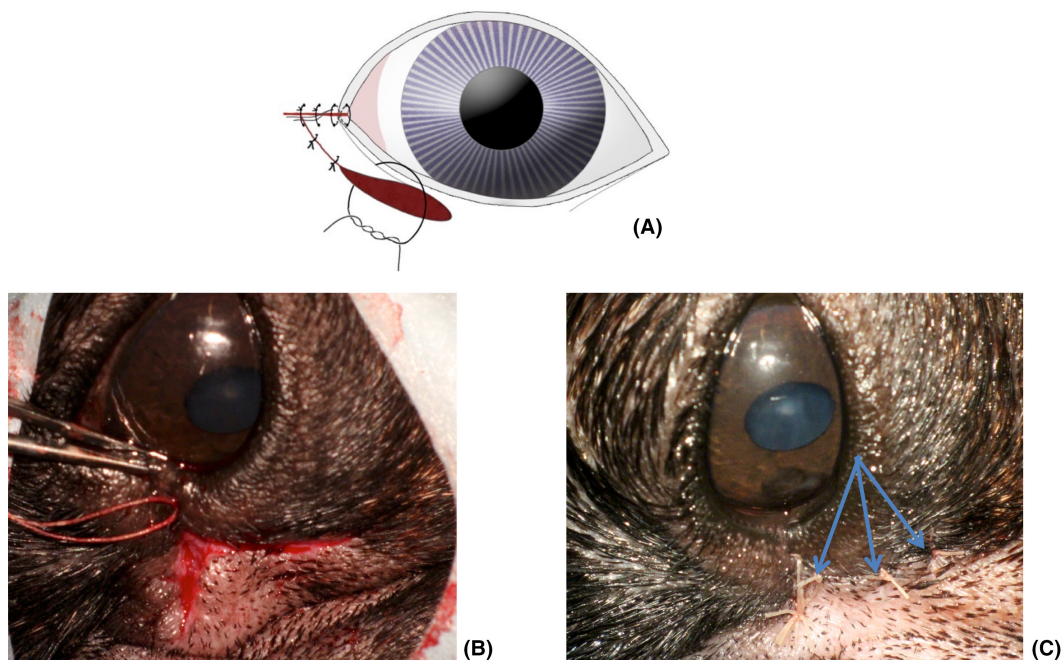


FIGURE 3 Depending on the individual dog, the medial canthoplasty may be combined with the correction of the nasal entropion. (A, B) A half-moon-shaped piece of skin is resected of the medial lower (and upper) eyelid close to the lid margin. (C) The wound is closed with single interrupted sutures.

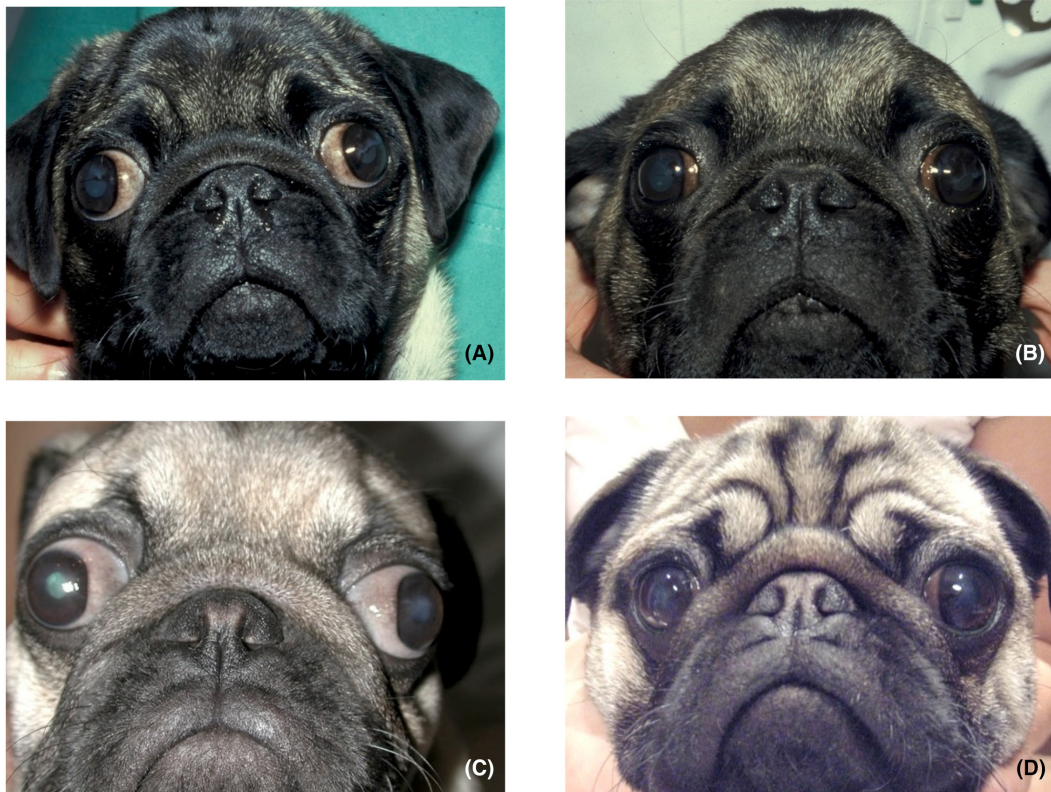


FIGURE 4 Pictures of two pugs with macropalpebral fissure and medial entropion before (A, C) and after modified medial canthoplasty (B, D).

included wound dehiscence (7), ulcerative keratitis due to irritating suture material (3) and wound infection (2). Wound dehiscence occurred unilaterally in all seven affected cases. In six cases, dehiscence involved loosening of the figure-8-suture only. Those cases healed without further intervention. In one case, dehiscence involved the deeper suture layer and surgical revision was performed. In one French Bulldog, bilateral wound infection occurred. Multiresistant *Staphylococcus pseudintermedius* and β -hemolyzing *Streptococcus* were cultured from the wound secretion. Within 5 days of treatment with enrofloxacin (5 mg/kg q24 h), chosen according to the sensitivity results, the wounds healed without further complications. Ulcerative keratitis close to the medial canthus caused by irritating suture material from the deeper suture layer healed in all three dogs within 3 days after removal of the protruding suture ends. The overall complication rate was 1.01% (12 out of 1180).

4 | DISCUSSION

Macropalpebral fissure is a common problem in brachycephalic dogs, namely in pugs, greatly contributing to ocular surface disease.^{12,14} Drastic reduction of the eyelid fissure length can be achieved with this modified MCP allowing

for a better coverage of the globe by the eyelids (Figure 6). This affects the tear film positively and therefore promotes corneal health.^{15–17} In pugs this MCP technique eliminates medial entropion along with the reduction of macropalpebral fissure, thereby correcting a significant contribution for pigmentary keratitis.¹²

The simplified MCP presented here allows for a drastic reduction of the length of the lid fissure, as it is not limited to the position of the lacrimal puncta and canaliculi (Figure 1B). This is different from other techniques described in the literature, where the lids are shortened only up to the position of the lacrimal puncta.^{1–8} By splitting the lacrimal canaliculi longitudinally, this simplified MCP translocates the lacrimal puncta deep into the conjunctival fornix allowing for proper outflow of the tears postoperatively. From our experience, the transposed puncta will remain open permanently, without the need to introduce a stent, if the canaliculi are split longitudinally and care is taken to spare the remaining conjunctiva from unnecessary trauma by avoiding crushing with the forceps (Figure 3, Videos 1 and 2). Due to the anatomical peculiarity of brachycephalic dogs having an accessory nasolacrimal duct opening located in the posterior nasal cavity and not adjacent to the nostril, the Jones test is expected to be usually negative in those breeds.¹⁸ Therefore, the

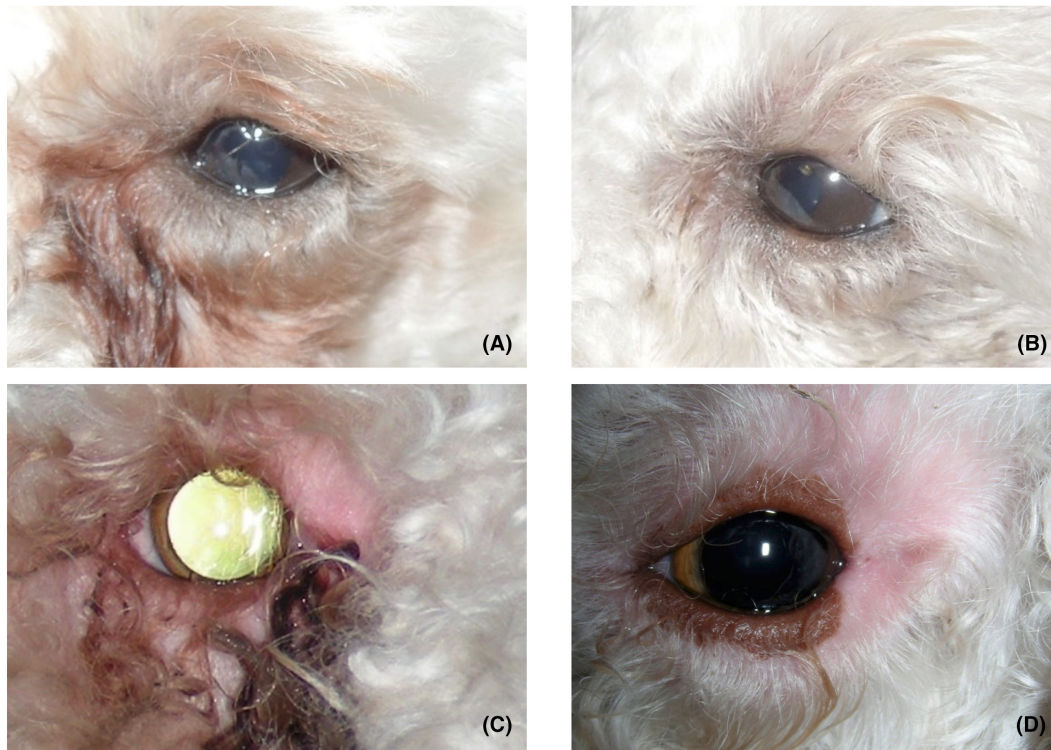


FIGURE 5 Photos of a Poodle (above) and a cross-breed dog (below) with epiphora due to trichiasis from a haired caruncle before (left, A, C) and after (right B, D) simplified medial canthoplasty. Note the improvement of the epiphora postoperatively.

Jones test is not a suitable test for patency of the nasolacrimal drainage system in short-nosed dogs. Contrary to Stades' statement that "the functioning of the tear ducts in short-nosed dogs is questionable,"⁸ the nasolacrimal duct has been shown to be patent and functioning in brachycephalic dogs.¹⁸ The nasolacrimal drainage system was examined in three brachycephalic dog breeds (Pug, French Bulldog, and English Bulldog) and they showed no clinical symptoms because of an aberrant outflow pathway.¹⁸ The brachycephalic dogs consistently exhibited an accessory opening, through which most of fluid escaped into the posterior nasal cavity instead of through the common route into the nasal vestibule via the nasolacrimal ostia.¹⁸ This is different from brachycephalic cats shown to have an abnormal course of their nasolacrimal duct.¹⁸ Brachycephalic cats mostly do not drain their tears through the common route but will show epiphora due to an overflow of tears.¹⁹ In our study the brachycephalic dogs which underwent the modified MCP with drastic shortening of the lid fissure far beyond the lacrimal puncta did not display any evident epiphora at the follow-up examinations.

Compared to the Robert-Jensen-pocket technique, the described modified MCP appears to be a technically simplified surgical procedure which does not require preparation and rotation of flaps. Positioning and meticulous atraumatic tissue handling are crucial.

Reducing the fissure length, correcting the medial entropion if present and eliminating the nasal trichiasis will lead to favorable long-term effects on ocular surface disease in brachycephalic breeds, namely pigmentary keratitis.^{15,16}

The extent of reduction of the palpebral fissure length by the simplified MCP is adjusted to the individual dog needs. In dogs with haired caruncles and epiphora only, reduction of the palpebral fissure is kept minimal and the simplified MCP leads to a significant reduction of the clinical signs without shortening the eyelid fissure.

The simplified MCP transposes the nasal canthus laterally, thereby avoiding nasal fold trichiasis. Thus, an additional nasal fold resection⁸ may only be necessary in rare cases with very prominent nasal folds. However, if nasal fold resection is used as primary technique, a simplified MCP may be added to address the macropalpebral fissure and the medial entropion, both of which will persist after the nasal fold resection.

In the simplified MCP technique, the conjunctiva is not sutured but left open in order to epithelialize on its own. This is different from previously described MCP techniques.⁵ Conjunctiva epithelializes quickly at a rate of 3.16 mm/day in a rabbit model,²⁰ and a conjunctival wound of 7 mm diameter will epithelialize within 7 days.^{21,22}

In this case series of 601 dogs (1180 eyes), the majority of the operated dogs (84%, 506/601) were brachycephalic



FIGURE 6 Shih Tzu dog with excessive epiphora due to caruncular trichiasis before (left, A, C) and after (right, B, D) simplified medial canthoplasty.

breeds (Pug, Shih Tzu dog, Pekingese dog, and French Bulldog). In total, 579/601 were operated bilaterally while 22 were operated unilaterally because the opposite eye was enucleated or the indication was unilateral facial nerve paralysis.

Andrews et al. reported postoperative complications in 10.6% of dogs (11/104) associated with suture breakdown or loss (5.8%, 6/104), suture reaction (3.8%, 4/104), and corneal ulceration from sutures (2.9%, 3/104).¹⁷ However, type of MCP technique used in the dogs of the study was not described in detail. In our case series, the overall complication rate was much lower (1.01%, 12/1180), consisting of dehiscence in 7 dogs (0.59%, 7/1180) where only 1 dog needed unilateral surgical revision, corneal ulceration from suture material (0.25%, 3/1180), and wound infection (0.16%, 2/1180). Transmission of bacterial contamination of the nasal fold of brachycephalic breeds to the surgical area has to be anticipated even after thorough surgical antisepsis. Remarkably, only 1 out of the 601 dogs showed clinical signs of a bilateral bacterial wound infection.

5 | CONCLUSION

The simplified MCP is a quick and effective surgical procedure to correct macroblepharon, medial entropion as well

as trichiasis all at once. Transposing the lacrimal puncta into the conjunctival fornix enables a more extensive shortening of the eyelid fissure than the previously described techniques. In brachycephalic breeds, the technique may be used to reduce the exophthalmos-related exposure keratitis along with the medial entropion allowing for a better tear film distribution in quantitative and evaporative dry eye disease while achieving satisfying cosmetic results.

AUTHOR CONTRIBUTIONS

Ingrid Allgoewer: Conceptualization; data curation; formal analysis; investigation; methodology; project administration; writing – original draft; writing – review and editing.

CONFLICT OF INTEREST STATEMENT

The author declares no conflict of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

This study complies with the Guidelines for Ethical Research in Veterinary Ophthalmology (GERVO) and is approved by

the responsible authority (Landesamt für Gesundheit und Soziales, Berlin, Germany) under the registration number StN° 040-2023. Animal owners or owners' representatives provided written consent for the treatment provided and for the publication of data and images.

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REFERENCES

- Jensen HE. Canthal closure. *Compend Contin Educ Pract Vet*. 1979;1:735-741.
- Stades FC, Boevé MH. Correction of medial canthus entropion in the Pekingese. *New Orleans Transactions of the Scientific Program of the Intl Soc of Vet Ophthal*. *Trans Intl Soc Vet Ophthalmol*. 1986;7.
- Gelatt KN, Gelatt JP. In: Gelatt KN, ed. *Handbook of Small Animal Ophthalmic Surgery Volume 1: Extraocular Procedures*. Elsevier Science, Inc.; 1994.
- vanderWoerd A. Adnexal surgery in dogs and cats. *Vet Ophthalmol*. 2004;7:284-290. doi:10.1111/j.1463-5224.2004.04044.x
- Yi NY, Park SA, Jeong MB, et al. Medial canthoplasty for epiphora in dogs: a retrospective study of 23 cases. *J Am Anim Hosp Assoc*. 2006;42(6):435-439. doi:10.5326/0420435
- Saito A, Umeda Y, Wakaiki S. Canine medial canthoplasty: new technique. *Proceedings of the annual conference of the American College of Veterinary Ophthalmologist*. *Vet Ophthalmol*. 2010;13(6):407-423. doi:10.1111/j.1463-5224.2010.00852.x
- Sandmeyers LS, Grahn BH. Diseases and surgery of the canine nasolacrimal system. In: Gelatt KN, ed. *Veterinary Ophthalmology*. Vol 2. 6th ed. Wiley-Blackwell; 2021:990-1000.
- Stades FC, van der Woerd A. Diseases and surgery of the canine eyelid. In: Gelatt KN, ed. *Veterinary Ophthalmology*. Vol 2. 6th ed. Wiley-Blackwell; 2021:959-961.
- Lieberknecht CG, Lieberknecht CF, Januzzi FG, Prando FS, Rosa M, Pereira JS. Blepharoplasty of the nasal caruncle entropion and caruncle trichiasis by using "medial canthal thermotherapy". *Proceedings of the Annual Conference of the American College of Veterinary Ophthalmologist*. *Vet Ophthalmol*. 2010;13(6):407-423. doi:10.1111/j.1463-5224.2010.00852.x
- Bettenay S, Mueller RS, Maggs DJ. Lids. In: Maggs DJ, Miller PE, Ofri R, eds. *Slatter's Fundamentals of Veterinary Ophthalmology*. 6th ed. Elsevier Saunders; 2018.
- Chambers ED, Slatter DH. Cryotherapy (N₂O) of canine distichiasis and trichiasis: an experimental and clinical report. *J Small Anim Pract*. 1984;25(11):647-659. doi:10.1111/j.1748-5827.1984.tb03378.x
- Maini S, Everson R, Dawson C, Chang YM, Hartley C, Sanchez RF. Pigmentary keratitis in pugs in the United Kingdom: prevalence and associated features. *BMC Vet Res*. 2019;15:384. doi:10.1186/s12917-019-2127-y
- Allgoewer I. A simplified medial canthoplasty technique. *Abstracts: Annual Scientific Meeting of the European College of Veterinary Ophthalmologists 2013*. *Vet Ophthalmol*. 2014;17:1. doi:10.1111/vop.12135
- Sebbag L, Sanchez RF. The pandemic of ocular surface disease in brachycephalic dogs: the brachycephalic ocular syndrome. *Vet Ophthalmol*. 2023;26(Suppl 1):31-46. doi:10.1111/vop.13054
- Allgoewer I, Sahr S, Neumann K. Results of the evaluation of the long-term effect of different therapies on pigmentary keratitis (PK) of the Pug. *Abstracts: 47th Annual Meeting of the American College of Ophthalmologists*. 2016. *Vet Ophthalmol*. 2016;19:6. doi:10.1111/vop.12438
- Allgoewer I, Sahr S. Preliminary results of the evaluation of the long-term effect of different therapies for pigmentary keratitis in the pug. *Abstracts: Annual Scientific Meeting of the European College of Veterinary Ophthalmologists, London, UK May 15-18, 2014*. *Vet Ophthalmol*. 2014;17:6. doi:10.1111/vop.12191
- Andrews ALMM, Youngman KL, Packer RMA, O'Neill DG, Kafarnik C. A review of clinical outcomes, owner understanding and satisfaction following medial canthoplasty in brachycephalic dogs in a UK referral setting (2016-2021). *Animals (Basel)*. 2023;13(12):2032. doi:10.3390/ani13122032
- Sahr S, Dietrich A, Oechtering G. Evaluating malformations of the lacrimal drainage system in brachycephalic dog breeds: a comparative computed tomography analysis. *PLoS One*. 2021;16(9):e0257020. doi:10.1371/journal.pone.0257020
- Schlueter C, Budras KD, Ludewig E, et al. Brachycephalic feline noses: CT and anatomical study of the relationship between head conformation and the nasolacrimal drainage system. *J Feline Med Surg*. 2009;11(11):891-900. doi:10.1016/j.jfms.2009.09.010
- Zhu X, Beuermann RW, Cheng ZY, Ang LPK. Kinetic analysis of conjunctival epithelial wound healing in the rabbit model. *ARVO Annual Meeting Abstract* 2005.
- Shin Y-J, Lee T-S. Re-epithelialization of the conjunctiva after conjunctival excision in the rabbits. *J Korean Ophthalmol Soc*. 1989;30(3):335-340.
- Geggel HS, Friend J, Thoft RA. Conjunctival epithelial wound healing. *Invest Ophthalmol Vis Sci*. 1984;25:860-863.

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