CASE REPORT

Carbon Dioxide Cryoepilation for Canine Distichiasis: A Report of Four Cases

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Distichiasis is a clinically significant eyelid disorder in dogs, characterized by the abnormal emergence of cilia from the meibomian gland openings rather than the normal eyelash line. These ectopic hairs though sometimes asymptomatic frequently cause ocular irritation through constant friction against the corneal surface. Clinical manifestations range from mild epiphora, conjunctivitis to severe blepharospasm and corneal ulceration which can compromise vision and quality of life (Marchini *et al.,* 2024). The condition is reported more commonly in predisposed exotic breeds, those are suspected to have a hereditary basis although the exact mode of inheritance remains unclear (Verloop and Read, 2023). As per the authors experience, it is also seen in Rajapalayam and non-descript dogs. Conventional management strategies including manual epilation provide only temporary relief due to follicular persistence, while surgical and non-surgical permanent techniques often carry risks of scarring, eyelid distortion or pigmentary changes (Singh, 2002; Verloop and Read, 2023). Cryoepilation has emerged as a minimally invasive alternative offering targeted follicular destruction with preservation of eyelid anatomy (Verloop and Read, 2023; Reynolds *et al.,* 2023). The present case series documents the clinical management of eight eyes (4 canine patients) with distichiasis using carbon dioxide-based cryoepilation as an effective practical option for permanent resolution of distichiasis.

Case History and Observations

Four canine patients aged 2 months to 8 years old, 3 of Shih Tzu and 1 of Rajapalayam breed were presented to the Ophthalmology unit of Madras Veterinary College, Chennai during February to June 2026 with the clinical signs of epiphora, conjunctivitis, blepharospasm and intermittent squinting on both the eyes. On clinical examination all the animals had epiphora with Schirmer Tear Test (STT) values above the normal range, Fluorescin Dye Test (FDT) negative and abnormal hairs emerging from the opening of Meibomian glands of upper and lower eyelids. Based on the examination, all the cases were diagnosed as bilateral distichiasis. Surgical correction with CO_2 cryoepilation was opted for all the cases.

Surgical Management and Discussion

All four dogs were fasted for 12 h prior to surgery. Routine pre-anaesthetic evaluation confirmed fitness for general anaesthesia. Intravenous premedication included ceftriaxone (20 mg/kg), butorphanol (0.2 mg/kg) and diazepam (0.25 mg/kg). Induction was achieved with propofol (3 mg/kg, IV) and anaesthesia maintained with isoflurane. The periocular skin, eyelids and corneoconjunctival surface were aseptically prepared.

The patients were positioned in lateral recumbency and eyelids were secured with a Desmarres chalazion clamp and everted to expose the palpebral conjunctiva (Fig. 1). Cryoepilation was performed under ophthalmic operating microscope (4x magnification). A closed 2 mm CO_2-freezed cryoprobe was applied transconjunctivally over the target follicles. A double freeze-thaw cycle was employed (Fig. 2). In freeze phase, the first freeze was done with precooled probe applied to the palpebral conjunctiva adjacent to lid margin and placed over the estimated site of target distichiae follicles for 10-15 sec until an ice ball surrounded the follicle and extended 2-3 mm into adjacent conjunctiva and eyelid skin. In thaw phase, we allowed natural melting of freezed for 30 sec to maximize follicular damage. This slow thaw phase

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led to most cellular damage to the follicles. The process was repeated with overlapping ice balls until all distichiae were treated. After the final thaw, aberrant cilia were plucked using Barraquer forceps (Fig. 3).



Fig. 1: Application of Desmarres forceps over eyelid to expose aberrant cilia



Fig. 2: Application of carbon dioxide freezed cryoprobe over aberrant cilia

Postoperatively, patients were administered with IV dexamethasone (0.1 mg/kg) on the day of surgery, followed by oral cefpodoxime (10 mg/kg) and prednisolone (1 mg/kg) for 3 days and topical antibiotic drops twice daily for two weeks. An Elizabethan collar was applied to prevent self-trauma. To minimize bilateral discomfort, contralateral eye correction was performed after four weeks using the same technique. Post-operative examination revealed reduced swelling by 3rd day and complete recovery with no scarring and mild depigmentation by 30th day (Fig. 4).

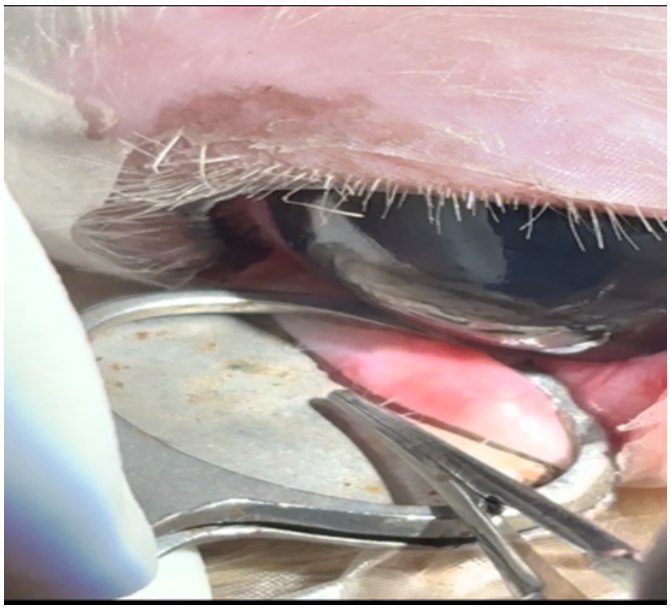


Fig. 3: Plucking of aberrant cilia with forces after freeze thaw cycle



Fig. 4: minimal depigmentation at 30 days post-surgery

Cryoepilation has long been recognized as an effective method for managing distichiasis in both human and veterinary ophthalmology. The principle of cryotherapy relies on rapid freezing followed by slow thawing which induces intracellular ice crystal formation, vascular stasis and ultimately follicular necrosis (Chambers and Slatter, 1984; Hoffmann and Bischof, 2002). Effective cell necrosis

occurs at –20 °C to –25 °C safely reached with probe tip temperatures around –80 °C. The double freeze–thaw cycle enhances this destructive effect, increasing the likelihood of permanent follicular ablation while minimizing recurrence.

Permanent treatment options for distichiasis include invasive techniques such as lid margin wedge resection, partial tarsal plate excision, palpebral conjunctival resection and lid splitting, as well as non-invasive methods like cryoepilation, electrocautery, electroepilation and blend electrolysis. These procedures however may lead to complications including eyelid distortion, scarring, entropion/ectropion, lacrimal punctal injury, depigmentation, conjunctivitis and tear film abnormalities (Grahn and Sandmeyer, 2019).

In canine patients, the choice of cryogen is critical to balance efficacy with safety. Liquid nitrogen with its extremely low boiling point of –196 °C produces aggressive freezing that is difficult to confine to the target follicle. This often results in collateral damage such as eyelid margin notching, scarring and permanent depigmentation. Nitrous oxide, while has less extreme boiling point (–89 °C) still carries a risk of deep tissue injury. In contrast, carbon dioxide provides a "middle ground" with temperatures between –50 °C and –78 °C. This range is sufficient to destroy follicular germinal cells but allows for slower ice ball expansion giving the surgeon greater control and precision.

The present case series demonstrates that CO_2 cryoepilation is particularly well suited for delicate periocular structures. All four dogs showed rapid postoperative recovery, with swelling subsiding by day 3 and complete healing by day 30. Importantly, cosmetic outcomes were favourable with negligible scarring and only minimal depigmentation. These findings support the use of CO_2 as a practical cryogen that reduces the risk of overtreatment and improves patient comfort. Compared to other invasive techniques such as wedge resections or tarsal plate excisions, CO_2 cryoepilation offers a minimally invasive alternative that preserves eyelid anatomy and function. The use of small-diameter cryoprobes further enhances precision, localizing the freeze zone to 2-3 mm around the follicle and preventing unnecessary damage to adjacent conjunctiva or corneal tissue (Verloop and Read, 2023; Reynolds *et al.,* 2023).

Postoperative complications in these cases were transient swelling and mild pigmentary changes both of which resolved without any intervention. No recurrence of distichiasis was observed during the follow-up period, underscoring the effectiveness of the double freeze–thaw protocol.

Overall, these cases highlight CO_2 cryoepilation as a safe, effective and practical option for permanent management of distichiasis in dogs. Its controlled freezing power, ease of storage and favourable cosmetic outcomes make it a superior choice over liquid nitrogen and nitrous oxide particularly when treating breeds predisposed to eyelid disorders.

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