Correcting mild entropion with a CO₂ laser

By William E. Schultz, DVM
For The Education Center

Entropion is a condition in which the eyelid rolls medially and contacts the cornea, causing epiphora and, in some cases, mild to severe corneal damage. Entropion may be developmental, spastic or cicatricial. Blepharitis, epiphora, squinting and rubbing at the eye and face area are all common sequelae of entropion.

Severe cases may require eyelid reduction, but in mild cases surgical spot treatment with the carbon dioxide laser typically corrects the problem. The application of laser light energy to the surface of the eyelid causes the collagen fibers within the dip tissues of the eyelid margins to contract. Such contraction facilitates roll-out of eyelid margins to their normal anatomical position.

In fact, the mechanism is similar to fractional CO₂ laser human skin resurfacing for rejuvenation and scar and stretch mark reduction. A study with clinical, histological and ultrastructural evaluation of human fractional CO₂ laser resurfacing described the fractional resurfacing as a “laser treatment modality to create numerous microscopic thermal injury zones of controlled width, depth and density that are surrounded by a reservoir of spared epidermal and dermal tissue, allowing rapid repair of laser-induced thermal injury” (p. 210). The study concluded that fractional CO₂ laser resurfacing offers significant surgical advantages with excellent esthetic results in balance with the biological structures.

Patient

Three-year-old male neutered Labrador retriever presented with heavy periorbital staining and mild bilateral upper and lower eyelid entropion (Figure 2). CO₂ laser surgical spot treatment was prescribed.

Equipment

40-watt flexible fiber waveguide Aesculight CO₂ laser (Figure 1) with straight adjustable focal spot size handpiece (Figures 3-8).

CO₂ Laser Settings

Spot size: 0.4 mm
Power output: 10 watts (Figure 1)
Laser mode: Single pulse 500 mSec (Figure 1)

Anesthesia and Procedure Preparation

Short-acting anesthesia may be used if only one lid is to be treated. Since in the described case both eyelids were affected, the patient was given a preanesthetic with pain meds, induced with Propofol and maintained on Sevoflurane.

Procedure Preparation

The lids were examined for distichiasis before the procedure. The lids were cleansed with 0.9 percent saline and a non-steroidal ophthalmic ointment was placed on the surface of the eye and conjunctiva (Figure 3).

Procedure

The handpiece is placed perpendicular to the eyelid surface (Figure 4). Laser energy is applied to the eyelid margin in the form of small spots positioned about 3 mm apart in rows (Figures 4-5). The spots are in alternating positions as each row is made. Visually, the eyelid begins to roll out on the first row of spots; with the second row, the eyelid should be in normal position. If needed, the third and fourth rows may be placed if the lid was not completely corrected.

In the described case, the lower eyelids required four rows of spots (Figures 6 and 8). Laser energy may be applied in other patterns, e.g., in X-shape pattern or linear pattern directed away from the eyelid margin (such patterns are described in detail in references 1 and 3), but we have found that the single spot pattern leads to less visible scarring on the eyelid surface.

Figure 1: Aesculight laser settings.

Figure 2: Mild upper and lower eyelid entropion with heavy periorbital staining.

Figure 3: Adjustable tipless handpiece was used for the surgery with 0.4 mm laser spot size.

Figure 4: Laser handpiece was held perpendicular to the eyelid surface.

Figure 5: Entropion correction began with two rows of spots made with the laser on the lower eyelids. Note the alternating placement of laser spots.

Figure 6: Three rows of spots were initially made on both lower eyelids.

Figure 7: Two rows of laser spots were placed on both upper eyelids.

Figure 8: Fourth row of spots was needed to fully correct the issue.

Figure 9: Immediately post-operative view.
Severe cases may require eyelid reduction, but in mild cases surgical spot treatment with the carbon dioxide laser typically corrects the problem.

In cases of more severe entropion, other surgical approaches are appropriate (see references 3 and 4).

In the procedure described, the upper eyelids were also slightly inverted and two rows of spots were made to correct the issue (Figures 7-9). It should be pointed out that slight overcorrection is usually not a concern because, as the eyelid heals, the mild swelling from the surgery recedes and the eyelid returns to a normal anatomical position.

The treated eyelids were cleaned with sterile saline-soaked gauze to wipe off the char (Figure 9).

**Post-operative Evaluation**

After the surgery was completed, the treated eyelid surfaces had minimal swelling. The eyelid margins assumed normal anatomical position.

**Post-operative Care**

The patient was dismissed with an E-collar as soon as ambulatory. Topical application of non-steroidal ophthalmic ointment to each eye three times daily for one week was prescribed. In addition, oral NSAIDs and mild pain meds were given for four to five days post-operatively.

**Follow-up**

Patient returned for evaluation 14 days after the procedure. The owners did not comply with the post-operative care instructions and removed the E-collar. As a result, the dog rubbed the treated sites severely and complete healing took two additional weeks.

**Conclusions**

Spot spacing and the ability to program laser power and pulse duration ensure excellent control and precision when applying laser energy. The described procedure shows the amazing potential for carbon dioxide lasers to coagulate the collagen fibers in epidermis and dermis with consequent shrinking of the skin, without bleeding or scarring.

No suturing is required and recovery is typically uneventful. The procedure is easily mastered with excellent postoperative results. The duration is dramatically shorter than an eyelid reduction procedure allowing for outpatient status.

---

**REFERENCES**