CO₂ Laser Surgery: Dermatologic Applications

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For the Education Series

The carbon dioxide (CO₂) surgical laser has many advantageous uses and is the primary laser in use today in veterinary dermatology. State-of-the-art CO₂ lasers feature flexible fiber waveguide beam delivery with scalpel-like handpieces for surgical accuracy and precision.

The surgeon can easily control the device for use in three ways: skin incision, lesion excision and ablation. It can be readily controlled for precise microsurgery or used for ablating larger lesions. Because its wavelength is highly absorbed by water, little to no collateral tissue damage occurs when this laser is used properly.

The Animal Skin & Allergy Clinic in Lynnwood, Wash., has used the CO₂ lasers made previously by Luxar and now by Aesculight (both of Seattle) for more than 20 years in our dermatology practice. These lasers feature precision and reliability that are indispensable for a surgeon, including: A) convenience and pinpoint precision of scalpel-like handpieces; B) calibration of the distal end laser power; C) ability to defocus the beam to switch between incising/excision and large-area ablation; D) rugged design thanks to all-metal laser tube technology. (In the 22 years I have used these lasers, I have never had a breakdown. One time the tube had to be recharged.); E) laster-generation laser handpieces use no disposables.

Some of the skin diseases we frequently treat include bovaceous in-situ carcinoma, apocrine cysts, nodular sebaceous gland tumors, follicular tumors (sometimes erroneously called sebaceous cysts), various nevi and skin tags, squamous cell carcinoma, precancerous actinic lesions on the nose and pinnae, and small tumors on the pinnae, muzzle, eyelids and paws. Many of these are treatable only with the CO₂ laser; others are more easily treated with the laser surgery.

Below are a few examples that demonstrate why the CO₂ laser is a necessary tool in today's veterinary dermatology practice.

NODULAR SEBACEOUS HYPERPLASIA

Tumors such as nodular sebaceous gland hyperplasia are the most common example of tumors that are removed easily with laser ablation in comparison to the conventional cold steel methods. These tumors are often left untreated because of the amount of surgery needed to remove them through conventional scalpel surgery. Without the option of laser ablation, these clients are told they have to live with these wart-like growths on their pets because the removal is too extensive for the pet and too expensive for the client. Removal of single tumors is often done using local anesthetic and no need for surgical clipping and prep.

ACTINIC IN SITU CARCINOMA (actinic keratosis)

Tumors such as apocrine cysts in the cat are untreatable without CO₂ laser surgery. These tumors cause chronic problems in the ears and on the chin of cats. If treated early, they can be removed readily with CO₂ laser ablation.

FOLLICULAR TUMORS

Removal of follicular tumors is much easier with CO₂ laser excision because of the advantage of minimal hemorrhage. The surgeon can easily see the tumor margins, and thus there is a smaller incision and less damage to the pet.

MEIBOMIAN GLAND TUMORS

Meibomian gland tumors on the eyelids are removed easily with CO₂ laser excision with minimal damage to the eyelids.

Pinnal Tumors

Tumors on the pinnae are often difficult to remove with conventional scalpel surgical excision or without causing some disfigurement. Additionally, with conventional surgery, bleeding occurs and the lesions require sutures to control the bleeding. Furthermore, it is difficult to remove just the lesion; thus, adjacent normal skin and cartilage are often excised, resulting in further deformities of the pinnae. With the CO₂ laser, hemostasis allows tumor removal without the need for sutures. Also, the operator can limit removal to just the lesion, avoiding damage to adjacent normal structures. Laser ablation results in much less scar formation, and thus no to minimal deformity of the pinnae.

Conclusion

In most dermatologic surgical procedures using CO₂ lasers, no sutures are required and no post-operative care is needed. The pet does not bother the lesion because the nerve endings are sealed by the CO₂ laser, and thus little to no pain is present after the surgery. The advantages of minimal hemorrhage, precise control of how much tissue to remove and minimal post-operative swelling make the CO₂ laser an invaluable tool in veterinary dermatology. The diseases mentioned here are the ones for which the laser is better than conventional scalpelsurgical surgery; in many of these conditions, conventional surgery would not be possible.

Clinical advances would not have been possible without constant technological developments and instrumentation improvements by Luxar and Aesculight in close cooperation with veterinarians across North America. Modern-day CO₂ surgical lasers are compact, rugged and affordable state-of-the-art surgical tools with a scalpel-like feel and handling. Presently, with the increased number of veterinarians using these devices, the potential indications for their use are expanding.

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This Education Series story was underwritten by Aesculight LLC of Woodinville, Wash., manufacturer of the only American-made CO₂ laser.