Flexible fiber CO₂ laser—a definitive instrument for tongue surgery

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For The Education Center

In dogs and cats, the tongue has important functions involved in prehending, chewing, drinking, swallowing, grooming and vocalization. The tongue is a muscular organ composed of both striated, the intrinsic and extrinsic muscles. The rostral two thirds of the tongue comprise its body, and the caudal one third comprises its root, which is attached to the hyoid apparatus. The dorsal surface of the tongue is covered by thick keratinized stratified squamous epithelium, which forms papillae. The ventral tongue surface contains less cornified mucosa. The lingual frenulum connects the tongue to the floor of the mouth (the intermandibular space). The tongue is richly vascularized and innervated. The nerves are important for the lingual sensory function including tactile, taste, thermal, pain and proprioception. Due to the important role of the tongue, lingual lesions may negatively impact an animal’s overall health and well-being. Therefore, early detection and surgical correction are necessary.

The CO₂ laser has become a well-accepted instrument for oral surgery used by many veterinary dentists. The 10,600-nanometer (or 10.6-micron) wavelength of the CO₂ laser causes a distinct tissue effect through heating intracellular water to produce steam and disrupt cell membranes resulting in tissue separation and hemostasis. Shallow thermal necrosis occurs to assist laser excision.

For most cutting precision and speed, the laser tip should be maintained 1 to 3 millimeters away from the target tissue. Traction and countertraction of tissue with surgical sponges and tissue forceps facilitate incisional surgical technique. To achieve hemostasis, the continuous wave mode is most efficient. Hemostasis also can be achieved by defocusing the laser beam spot size and reducing the potential for lateral thermal damage (tissue cools most efficiently when duration between pulses exceeds the thermal relaxation time).

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REFERENCES


**Case 4: Malignant Mass Excision**

A 9-year-old Chow mix was presented in respiratory difficulty. After preoperative workup, including normal blood tests and thoracic radiographs, the dog was anesthetized and examined, and a large mass obstructing its oropharynx was revealed. Fortunately, the mass was attached to the tongue via a pedicle that allowed laser and scalpel excision. Upon awaking, the dog could breathe normally. Malignant melanoma was diagnosed with incomplete excision. Melanoma vaccine was administered. Regrowth of the melanoma reoccurred 14 months after surgery.

In this case, the CO₂ laser was set to 10 watts in the continuous wave mode with a 0.8-millimeter focal spot size.

**Case 5: Ulceration**

The CO₂ laser is successfully used to photovaporize oral ulceration in human and veterinary medicine. CO₂ laser treatment usually results in pain relief and quick return to function. In this case, an FIV-positive cat presented for excessive salivation. Marked tongue ulceration was part of the presentation. Six laser treatments were necessary to resolve the tongue lesion after full-mouth extraction. For the treatment of tongue ulceration, the laser was set to 2 watts in the continuous wave mode, and the wide ablation nozzle was used.

Dr. Bellows is board certified by the Board of Veterinary Practitioners (canine and feline) and by the College of Veterinary Dentistry. He is past president of the American Veterinary Dental College and the Veterinary Dental Forum. Currently he is president of the Foundation for Veterinary Dentistry.