**CO\textsubscript{2}** laser excision of skin tumors

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**The Education Center**

The CO\textsubscript{2} laser uses a focused beam of light to cut tissue. The size of this cutting beam can be as small as 0.25 mm in diameter.

This small cutting tip enables the surgeon to excise lumps and bumps via small openings, smaller than was ever possible with steel scalpel blades.

Black markings in Figure 1 denote wide surgical margins around the tumor as it is typically done with the scalpel. Most skin nodules are not malignant (and do not require wide surgical margins), but some can be. Therefore, the tumors should be submitted for histopathologic evaluation.

With the CO\textsubscript{2} laser, incisions can be made close to or inside the outer visible edges of the tumor (e.g., Figures 3b-3e). The ability to excise a tumor via smaller openings is critical in areas where there is not enough skin to excise with the tumor (e.g., tail, limbs, etc.).

It makes removal of tumors attainable with a simple excision without grafting or other special surgical techniques. In areas with sufficient amounts of skin, this surgical technique is beneficial as it requires less operatory and anesthesia time, and yields more cosmetic results (Figures 2a-2c).

The types of tumors that can be removed with the small opening technique are follicular tumors (trichoepitheliomas, infundibular keratinizing acanthomas, trichoblastomas and pilomatrixomas), nevi and hamartomas, lipomas and so on. Locations where this technique is especially advantageous are the legs, pinna, tail, digits, nose, face and eyelids.

**Surgical Case Examples**

**Case 1**: An example of skin tumor laser excision via a small opening, note the lipoma removal on the foreleg of a 7-year-old pit bull mix (Figures 3a-3e).

First, an oval 2.5 x 0.5 cm incision was made with the flexible fiber waveguide CO\textsubscript{2} laser. Note in Figures 3b and 3c that the elasticity of the skin made the actual opening large enough to remove the tumor. After that, the laser was used to gradually work around the lipoma to free it from the surrounding subcutaneous attachments.

The hemostasis achieved by the laser provided good visibility. There is often adipose tissue around the tumors. The CO\textsubscript{2} laser evaporates it, which exposes the margins between the tumor and the surrounding healthy tissue and allows the surgeon to separate them easier. It is necessary to have one or two assistants to apply traction to the tumor and the normal tissue (Figure 3c) as the surgeon directs the laser beam separating the tumor from adjacent tissue.

Note in Figures 3b-3d that the long narrow piece of skin on top of the tumor shows the actual amount of skin that was removed to excise this tumor. The lipoma in Figure 3a prior to surgery was approximately 5.5 x 3 cm, the incision required to remove this tumor was only 2.5 x 0.5 cm (as indicated by the size of the strip of skin on top of the tumor in Figure 3b).

**Case 2**: One of the most common nodular skin tumors in dogs is the follicular tumor. These have a cystic structure and contain keratin and sebaceous material. Figures 4a-4c demonstrate the excision of a trichoblastoma in a 5-year-old Labrador retriever.

In Figure 4a, note the subcutaneous swelling in the tissues adjacent to the lesion; this swelling delineates the extent of the tumor under the skin. A laser incision was made well inside the borders of the tumor and the entire tumor was later removed via this small opening. During the surgery, the contents of the tumor leaked (see yellowish, caseous material Figure 4b). In such cases, the solution is to press gently on the tumor and express the contents out onto the surrounding skin while an assistant wipes the area with saline-soaked gauze to keep the surgical field clean.

In this case, once the tumor contents were removed, the tumor was reduced in size and it was easier for the surgeon to take out (Figure 4c).

**Case 3**: Series of Figures 5a-5c shows the CO\textsubscript{2} laser excision of a follicular hamartoma in a 6-year-old Havanese dog. The incision was approximately one-third the actual size of the lesion (Figures 5b-5c). Note the hemostasis created by the CO\textsubscript{2} laser and excellent visibility of the surgical field. No sutures were recommended.
required and the surgical site was left to heal by second intention (Figure 5c).

Potential Complications

Because the small capillaries are sealed along the surgical incision there is a slight delay in wound healing of laser incisions, so suture removal (if sutures were required) should be done at three weeks post-operatively instead of 10 to 14 days.

Large tumors will leave a space once removed, so measures to prevent seromas need to be taken, such as drain placement and pressure wraps. Also, as with any surgical procedure, the site needs to be protected from damage, so pressure bandages on the surgical site and restriction of exercise are required as needed.

There is potential for re-growth of the tumor if all of the neoplastic tissue is not removed. This rarely happens, and with experience the surgeon will be able to ensure complete removal at the time of the surgery.

Conclusions

The CO₂ laser gives the surgeon the opportunity to make smaller, precise incisions from which to remove tumors with enough skin preserved to close the incision without grafting or significant movement restriction in the patient. Other advantages are less surgery and anesthesia time, as well as great esthetic outcomes.

The CO₂ laser technique discussed in this article helps to ensure the successful removal of challenging tumors that would have been either extremely difficult or impossible to achieve with a traditional scalpel surgery.

This Education Center article was underwritten by Aesculight of Woodinville, Wash., manufacturer of the only American-make CO₂ laser.

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