Advantages of CO₂ laser mastectomy

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Introduction
Veterinarians face numerous challenges when performing mastectomies, especially in older patients. For example, older animals are at higher risk for general anesthesia.

Another potential problem is excessive bleeding. Hemorrhage obstructs the surgeon’s view of the operating field and, consequently, prolongs the surgery time. Poor visualization can potentially lead to unsatisfactory esthetic results as well.

Another frequent complication is postoperative seroma formation caused by a large dead space remaining after the resection and by serum leaking from severed lymph vessels if not treated. Finally, postoperative pain is another possible negative outcome of a mastectomy. What can be done to deal with the aforementioned complications? In our case, the solution was simple and came in the form of a CO₂ laser. Lately, we have used our Aesculight CO₂ laser for all routine surgeries. It significantly reduces surgery time, which for older patients translates into less time under anesthesia.

To a large extent, the surgery can be completed faster due to reduced bleeding and therefore shorter time spent maintaining the clear surgical field. Our adjustable spot-size hand piece has become another time-saving solution for us, as it allows the surgeon to effortlessly switch between laser spot sizes during surgery with no need to waste time changing tips.

Because the laser seals smaller blood and lymphatic vessels as it cuts, post-operative swelling is reduced, which means less pain for the patient. Importantly, sealing the lymphatics helps the surgeon prevent post-operative seroma.

The case below describes a CO₂ laser complete unilateral mastectomy.

Patient: 10-year-old female toy poodle. (Note: we performed spay prior to mastectomy during the same visit.)

Complaint: The patient had multiple mammary gland tumors throughout the chain. It was decided to remove the tumors by complete unilateral mastectomy.

Surgery preparation: Patient was placed in dorsal recumbency. The hair in the planned surgical site was clipped and the area prepared for aseptic surgery.

Anesthesia: Butorphanol and midazolam were injected as premedication. Propofol was used as an induction agent. Anesthetic depth was maintained with isoflurane.

Equipment: Aesculight 3020 CO₂ laser with an adjustable tipless hand piece. Laser Settings: Marking prior to incision: 0.25 mm spot size, 5 watt repeat mode (P7).

Initial skin incision: 0.25 mm spot size, 20 watt super pulse mode.

Resection: 0.4 mm spot size, 15 watt continuous wave mode.

Avulsion: 0.8 mm spot size, 10 watt continuous wave mode.

Step 1: Marking the incision. First, the planned elliptical incision around all five mammary glands of the affected side was outlined on the patient’s skin using the laser in the repeat mode at low power intensity, i.e. P7 mode at 5 W (Figure 1). The planned incision can instead be outlined with a sterile marker. The outline included the safety tissue margins of approx. 1 – 1.5 cm (Figure 2).

Step 2: Skin incision. The initial incision was made along the marked outline with the 0.25 mm spot size in the super pulse mode (SP) at the 20 W (Figures 3 - 5). Note the lack of bleeding during this first incision.

Step 3: Resection. The laser spot size was changed to 0.4 mm. The laser was switched to the continuous wave mode (CW) and set to a power level of 15 W. The incision was made through the subcutaneous tissues to the fascia of the external abdominal wall. The Metzenbaum scissors were used as a backstop during the resection.

First, a small opening was made with the Metzenbaum scissors; next, the scissors were inserted through this opening and a laser cut was made. This step was repeated until the entire mammary gland chain was completely outlined (Figures 6-7).

Larger vascular structures were ligated using the usual ligation technique to prevent excessive bleeding. At this point, the mammary chain was ready to be removed.

Step 4: Avulsion and Removal. Figures 8 and 9 show the mammary tissue avulsion and removal. Counter traction was applied to facilitate cutting. Insignificant hemorrhage occurred and the laser was used in the CW mode at the lower power setting of 10 watts with the 0.8 mm spot size to create hemostasis (Figure 10).

Step 5: Ligation of Large Vessels. During this procedure the surgeon should pay attention to bigger blood vessels, such as the caudal superficial epigastric artery and external pudendal artery. The traditional ligation technique was used in this case (Figure 11).

Step 6: Closure. 3-0 Monocryl was used for subcutaneous tissue suturing. First, the subcuta-
ous tissues were closed using the walking suture technique (Figure 12). Then simple interrupted skin sutures were placed to complete the closure (Figure 13). 3-0 nylon was used for skin closure. At this stage, there was no bleeding and no Penrose drain was placed.

**Step 8: Post-Operative Therapeutic Laser Application.** Immediately after the surgery, class IV therapeutic laser was applied to the wound. It accelerates the healing process and decreases chances of postoperative inflammation.

**Step 9: Dismissal from the clinic.** The patient was dismissed from the clinic as soon as ambulatory. Note: The patient left the clinic with an E-collar (no bandages). Baytril and NSAIDs were prescribed for five to seven days.

**Step 10: Two-week post-operative follow-up evaluation and suture removal.** At the two-week post-operative evaluation visit, the wound was clean with no signs of inflammation or swelling (Figure 14). Upon the evaluation, sutures were removed.

**Step 11: Four-week post-operative follow-up evaluation.** Four weeks after the surgery, the patient’s hair already had regrown and the scar was not prominent. The pet was comfortable and the owner was happy with such rapid successful healing. The result is shown in Figure 15.

**Summary**

The use of the CO₂ laser in surgery allows the veterinarian to prevent some potential complications. The hemostatic capacity of the laser helps maintain intra-operative visualization of the surgical site and shortens the surgery time by reducing bleeding and the time spent on maintaining the site blood-free.

In addition, when the patient is a high anesthesia risk due to age or other factors, the shorter CO₂ laser surgery clearly provides a safer alternative to more traditional surgical instruments.²,³

Good visualization during surgery ensures great aesthetic results. Among other advantages of laser surgery is less post-operative pain and discomfort for the patient. The sterilizing effect of the laser beam significantly lowers the risk of infection.²

Our CO₂ laser has proved to be a great tool to grow our clinic’s surgical capabilities and improve surgical outcomes, which has resulted in happier pets and owners—and all our staff, too. ●

Dr. Masahiro Seki is the owner of Animal Laser Center in Nagoya, Japan. He is the first board-certified veterinary laser surgeon in Japan; he uses both the CO₂ and diode laser wavelengths in his practice. Dr. Seki is a diplomate of the American Board of Laser Surgery, and a director at the Japanese Laser Veterinary Science Society.

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

**REFERENCES…**


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