Treating sea turtle fibropapillomatosis with CO2 laser surgery

By Ansa Gladstone, Ph.D.
For The Education Center

L
ucké, a debilitated juvenile green sea turtle (Chelonia mydas) found stranded in Volusia County, Florida, was taken to the Georgia Sea Turtle Center on Jekyll Island. His body, including the right eye, was covered in multiple tumors (Figures 1A and 1B). Blood tests showed severe anemia (packed cell volume of 9 percent) and low protein and albumin. A CT scan revealed internal tumors, and a diagnosis of fibropapillomatosis was made.

Surgical Treatment

Sea turtle fibropapillomatosis (FP) is a debilitating infectious disease commonly attributed to alpha herpesvirus, a chelonid fibropapilloma-associated herpesvirus.1 FP affects sea turtles in tropical and subtropical coastal waters, with the highest rates occurring in Florida, Hawaii and the Caribbean.2 The green sea turtle is more frequently and severely affected than other hard-shelled sea turtle species.3-5

Physical characteristics of FP are single to multiple cutaneous tumors consistent with papillomas, filomas or fibropapillomas.1 FP masses mostly occur on soft skin, but can extend into the shell, affect the eye (conjunctiva, corneal) and periocular area. The tumors can involve any tissue, even extending to skeletal or muscular tissue, or may be oriented towards unusual sites, such as the oral cavity, lungs, kidneys, liver, heart or GI tract.4

The Georgia Sea Turtle Center’s state-of-the-art technology, the flexible fiber CO2 laser (Aesculight), allows for laser vaporization of FP masses.5 Historically, FP tumors have been removed by scalpel, electrocautery, cryosurgery and CO2 lasers.6 However, today the laser has become the standard of surgical treatment of FP tumors in sea turtles. The Georgia Sea Turtle Center’s state-of-the-art technology, the flexible fiber CO2 laser (Aesculight), allows for laser vaporization of FP masses.

Surgery was performed by Terry Norton, DVM, Dipl. ACZM, director of the Georgia Sea Turtle Center. The tumor on Lucké’s right eye (Figure 2) was removed with CO2 laser surgery, using a 10–15 watt laser at the bedside of a 140 kilogram sea turtle. Dr. Norton describes the surgery:

"The patient was anesthetized and put on a ventilator for the surgery. Figure 3A shows Lucké 10 days post-op with a large corneal defect. Figure 3B shows Lucké 10 days post-op with a smaller corneal defect. The patient recovered well. He was put on analgesics and antibiotics, and was closely monitored and kept out of his water tank for 24 hours. Afterward, he was returned to his tank. Healing progressed without complications. Figure 4 shows Lucké 10 days post-operatively. Figure 5A-5C shows him at four weeks after the surgery. Figures 5A-SC show the patient’s healing at six-week follow-up examination, soon after which he was released back into the wild.

Conclusion

Such success stories are becoming common thanks to organizations like the Georgia Sea Turtle Center, Mote Marine Laboratory, Gumbo Limbo Nature Center, and the Turtle Hospital, among others, all of which have flexible fiber CO2 lasers. By using this technology, masses are able to achieve hemostasis, mostly secondary intention healing, diminished swelling, reduced risk of infection, minimized energy use and improved recovery of their patients.4-8

Terry Norton, DVM, Dipl. ACZM, is the founder and director of the Georgia Sea Turtle Center on Jekyll Island.

Dr. Norton describes the behavior of myofibroblasts on scalpel and CO2 laser wounds: an immunohistochemical study.9

Dr. Norton and his colleagues noted a difference in the behavior of myofibroblasts on the two wounds. The CO2 laser wounds showed less scarring and inflammation compared to scalpel wounds. This was attributed to the reduced energy density of CO2 laser wounds compared to scalpel wounds.


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Lucke’s Laser Surgery and Recovery

The patient was anesthetized and put on a ventilator. Surgery started with the challenging task of removing several tumors from Lucke’s right eye (Figure 2). The high precision of the CO2 laser was crucial for this delicate procedure. The tumors were narrower at the base—they were attached to the cornea by a filiform pedicle.

Traction tension was applied to each mass and the laser beam was directed perpendicularly to the pedicle (parallel to the cornea) and used to undermine the masses, gradually “peeling” them off the globe with no collateral damage to the healthy tissue.4

Dr. Norton emphasizes the importance of preserving the tumor’s vision and using only a small amount of ophthalmic cautery and saline-moistened gauze to protect its eyes. On the other hand, if the cornea is effaced or the tumor has invaded the globe, the eye must be enucleated.3

After Lucke’s eye tumors were excised, the remaining masses were removed from his neck, flippers and plastron. Veterinary surgeons must use high laser power settings, or else the papillomas will recur. Dr. Norton, for example, uses 16-18 watts in the continuous mode for incisions. No sutures were required.

The patient recovered well. He was put on analgesics and antibiotics, and was closely monitored and kept out of his water tank for 24 hours. Afterward, he was returned to his tank. Healing progressed without complications. Figure 3 shows Lucke 10 days post-operatively. Figures 4A-4C show him at four weeks after surgery. Figures 5A-5C show the patient’s healing at his six-week follow-up examination, soon after which he was released back into the wild.

Conclusion

Such success stories are becoming common thanks to organizations like the Georgia Sea Turtle Center, the Turtle Hospital, among others, all of which have flexible CO2 lasers. By using this technology, veterinary lasers are able to achieve hemostasis, mostly secondary intention healing, diminished bleeding, reduced risk of infection, minimized scarring and improved recovery of their patients.7

Terry Norton, DVM, Dipl. ACZM, is the founder and director of the Georgia Sea Turtle Center on Jekyll Island. Dr. Norton is a veterinarian and book author. He is an adjunct professor at the University of Georgia, University of Florida, North Carolina State University and Tufts University Cummings School of Veterinary Medicine. He has published numerous articles for referred journals and book chapters. He is a graduate of the University of California, Davis College of Veterinary Medicine and completed a residency in zoological medicine at the University of California, Davis and the San Diego Zoo.

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*Sponsored by Aesculight

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

REFERENCES...


