

A special advertising section

How to ablate canine vertical ear canal with CO₂ laser

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For The Education Center

Otitis externa is an inflammation of the vertical and horizontal ear canals and surrounding structures, such as the external auditory meatus and pinna.¹ Symptoms include pain, scratching and rubbing of the ears and a malodorous discharge, among others. Otitis externa may be associated with other dermatologic diseases (e.g., allergies) or systemic diseases.

Other possible causes include bacterial infections, fungi, yeasts, parasites (e.g., *Demodex canis*, ticks), foreign bodies or neoplasia. Contributing factors that make animals more susceptible to otitis externa include excessive moisture in the ear canal and a narrow or convoluted ear canal conformation.

Although dogs of any breed can develop ear infections, some breeds are more predisposed than others. Among such high-risk populations are breeds with pendulous ears (e.g., spaniels, basset hounds) and those with abundant hair on the inner ear flap (e.g., poodles, schnauzers, Old English sheepdogs).¹

When the underlying cause of otitis externa is not properly identified, the disease tends to reoccur and can become chronic. Secondary to infection, hyperkeratosis and hyperplasia of the skin may occur. Calcification of the ear canal can develop. The presence of hyperplasia, hyperkeratosis and calcification can impede the delivery of medication into the ear canal, thus leaving the dog with chronic infection and pain.

Several surgical approaches exist for the treatment of otitis externa, such as lateral ear canal resection, vertical

ear canal ablation and total ear canal ablation with bulla osteotomy, with each removing progressively larger portions of diseased tissue. It is always important to determine the extent and severity of the disease and select the appropriate type of surgery in order to prevent insufficient treatment (may require repeat surgery) or over-treatment (may create potential for more complications).

Case Study

Joey, an 8-year-old male cocker spaniel, had ear infections chronically for many years and was referred to our clinic for possible total ear canal ablation. Joey was in pain on ear palpation and a malodorous discharge was noted. Severe hyperkeratosis and hyperplasia affected both the vertical canal and the medial surface of the ear flap (Figures 1 and 2). The ear canal lumen was significantly constricted, which precluded effective application of topical medications to the diseased area.

Based on the results of the physical examination and radiographs, it was concluded that Joey's case could be managed by a vertical canal ablation with removal of the hyperkeratotic region of the ear flap.

Choice of Technique

Sharp dissection is an acceptable technique. However, the lack of hemostasis with a scalpel makes surgery quite difficult. The use of electro-surgery is associated with postoperative tissue edema and extensive thermal necrosis, thus compromising healing.

The surgical CO₂ laser produces sufficient hemostasis without the significant tissue damage associated with electro-surgery. Studies have shown that with the proper combination of laser settings and the surgeon's hand speed, the thermal tissue change with the CO₂ laser can be as small as 30 microns.²

Laser Equipment and Settings

The flexible hollow waveguide CO₂ laser system (Aesculight 4020) with the Aesculight adjustable spot size tipless hand piece (Figures 3-5 and 7-8).

Incisions were made using the SuperPulse mode at 15 watts with 0.25 mm focal laser spot size.

Dissection was performed in the continuous wave mode at 15 watts with 0.4 mm focal spot size. Coagulation was achieved with the same spot size and settings.

Patient Preparation

Before surgery, bacterial and fungal culture and sensitivity tests were performed to determine the appropriate antibiotic therapy. The specimens were taken from as deep in the canal as possible. Importantly, both aerobic and anaerobic cultures always should be tested. Joey was put on appropriate oral and topical antibiotics.

Anesthesia and Pain Management

Joey was given preoperative and intraoperative pain medications (torbutrol and morphine, respectively). Anesthesia was induced with propofol and maintained

with sevoflurane with IV fluids and monitoring. The pinna and surrounding tissues were thoroughly shaved and prepped for aseptic surgery with chloroxynol. Due to



Figure 1. Chronic otitis externa (preoperative view of the affected ear)



Figure 2. Initial CO₂ laser incision.



Figure 3. Initial incision is extended until it reaches the level of horizontal canal.



Figure 4. Horizontal incision is then made parallel to the tragus.



Figure 5. Area of hyperkeratosis is outlined with the laser.



Figure 6. If needed, sharp dissection with mayo scissors is performed.



Figure 7. Dissection around the vertical ear canal.



Figure 8. Dissection around the vertical ear canal is gradually continued.



Figure 9. Horizontal ear canal is sutured to skin starting at 6 o'clock mark using simple interrupted pattern.



Figure 10. Vertical and then horizontal incisions are closed using interrupted cruciate pattern.



Figure 11. Horizontal canal is medicated daily.



Figure 12. Two weeks post-op view just prior to suture removal.



Figure 13. Healing at two months after the surgery.

severe narrowing of the vertical canal, the surgical preparation could not include the entire vertical and horizontal canals.

Surgical Procedure

A T-shaped incision is made with the laser. The laser hand piece is held perpendicular to the target tissue. The initial incision begins at the tragus and extends ventrally to the level of the horizontal canal (Figures 2 and 3). The horizontal incision is made parallel to the tragus (Figure 4). The connective tissue is then reflected, exposing the vertical ear canal. The horizontal incision is then continued around the external auditory meatus outlining the hyperkeratotic area (Figure 5). Outlined skin is grasped with tissue forceps to create tension and then undermined with the laser (Figures 7 and 8). This is a full-thickness dissection, including the cartilage. If needed, sharp dissection is done with mayo scissors across the base of the ear flap (Figure 6).

Once the vertical ear canal is exposed and free from all muscle and fascial attachments, it is transected at the vertical/horizontal canal juncture, leaving horizontal canal and tympanum intact.

Wound Closure

A 2-0 monocryl suture is used. The opening of the horizontal canal is sutured to the skin starting at the 6 o'clock position in a simple interrupted pattern, making sure to penetrate the cartilage (Figure 9). The closure proceeds vertically using an interrupted cruciate suture pattern. When the vertical incision is closed, the top of the T-shaped incision is sutured in a similar pattern (Figure 10).

Postoperative Care

Joey was sent home the evening after surgery. Vet-profen and tramadol were given during the first week. Joey was on oral Zeniquin and topical gentocin otic for 10 days postoperatively. The horizontal canal was medicated daily with gentocin otic (Figure 11), and scabs were not allowed to form on the incisions. Joey was brought to the clinic every four to five days for thorough cleaning and medication until suture removal. (It often is difficult for owners to keep the incision completely clean themselves).

Cold compresses were recommended for the first few days after surgery to minimize the risk of postoperative edema. Joey wore an E-collar from postoperative recovery till two days after suture removal.

Follow-up Examinations

Two weeks postoperatively the sutures were removed (Figure 12). The two-month follow-up examination showed excellent healing with resolution of the horizontal ear canal infection (Figure 13).

Conclusion

The procedure provides improved aeration and drainage of the horizontal ear canal. This allows for a more successful continuation of medical treatment (until the resolution of the issue, in Joey's case).

The CO₂ laser greatly enhances ear canal surgery by minimizing bleeding and providing good visualization of the anatomical structures during the procedure. This helps the surgeon avoid nerves located at the junction of the external and middle ear canals.

We also have noticed that in comparison to the

standard cold steel procedure, postoperative drainage from the surgical wound has been markedly decreased. Postoperative swelling is reduced following laser treatment, resulting in less patient discomfort. In effect, the CO₂ laser is our preferred surgical modality for ear canal ablation. ●

Dr. Schultz graduated from Michigan State University in 1973, went into private practice and opened his companion animal practice in 1974. He has been a board member on the Synbiotics Reproductive Advisory Panel, the Society for Theriogenology and the Theriogenology Foundation. He has spoken at several veterinary conferences and before veterinary associations and national specialties because of a special interest in canine reproduction. He has lectured and published articles on transcervical and surgical inseminations using fresh, chilled and frozen semen. Dr. Schultz also is interested in soft tissue and orthopedic surgery. He has more than 20 years of experience with laser surgery, and he uses a 40-watt flexible hollow waveguide CO₂ laser with constant wave and SuperPulse modes.

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



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