Minimally Invasive Laser Treatment of Arytenoid Chondritis in Five Horses

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Infections of the arytenoid cartilages with granulomas and abscesses can be successfully treated using the diode laser administered via an endoscopically guided ventral stab incision in the cricothyroid membrane. However, horses with severely thickened arytenoid cartilage are not candidates for the minimally invasive procedure. Author’s address: Marion duPont Scott Equine Medical Center, VA-MD Regional College of Veterinary Medicine, PO Box 1938, Leesburg, VA 20177. © 2001 AAEP.

1. Introduction
Arytenoid chondritis is an infection within the arytenoid cartilages of the larynx. Affected performance horses produce upper airway noise and experience exercise intolerance and respiratory compromise. Affected cartilages may become thickened and distorted, which prevents mobility during respiration and obstructs airflow. Traditionally, the condition is treated by removal of the affected cartilage (arytenoidectomy), which decreases maximal athletic performance of the horse. This article describes the treatment of 5 standing horses in which laser debridement of cartilages in the acute stages of infection was performed.

2. Materials and Methods
Four adult Thoroughbred racehorses and one Thoroughbred × Percheron show horse were admitted for evaluation of laryngeal masses, upper airway noise, laryngeal dysfunction, or coughing. The referring veterinarian had diagnosed one racehorse to have left laryngeal hemiplegia (LLH) 3 weeks earlier, and it had no other abnormality at that time. Initial endoscopic exam revealed arytenoid chondritis in all horses. Common features of the affected arytenoid cartilages were 3–6-mm granulating masses on the mucosal surface and visible mucosal defects in the corniculate processes or bodies, some of which appeared to lead to deeper tracts. Mild to moderate ipsilateral perilaryngeal swelling was evident and arytenoid cartilage mobility was impaired (Fig. 1). Severe thickening or deformity of the affected arytenoid cartilages was absent, although the corniculate process, when affected, was slightly atrophied. None had received treatment prior to admission.

The horses were placed in stocks and sedated using xylazine (0.2–0.4 mg/kg, IV) and detomidine (0.01–0.02 mg/kg, IV) to effect. The head was supported in an elevated position manually or using a chin support. The throatlatch area was routinely prepared for aseptic surgery, and local anesthesia (mepivacaine) was placed intradermally and subcutaneously along the line of a routine ventral laryngotomy immediately ventral to the cricothyroid membrane. A 1-cm incision directly ventral to the cricothyroid membrane was created using a #10 Bard-Parker blade, and a 5 mm × 6.5 cm trocar was inserted into the airway through the cricothyroid
membrane using videoendoscopic guidance. The inner laryngeal surface was observed endoscopically after spraying the laryngeal mucosa with mepivacaine via the endoscope’s biopsy channel. A 2-mm flexible probe was inserted through the trocar and into the tracts for exploration. The laser output was set to 20 watts, and a malleable fiber guide containing a 600-μm free beam 980-nm diode laser fiber was inserted through the trocar. Using endoscopic guidance, the granulation tissue, abnormal mucosa and affected cartilage were vaporized by noncontact laser energy (Fig. 2). Suction was applied to the biopsy channel of the endoscope for smoke evacuation. In all cases, use of the laser was terminated when the target tissue was too deep to observe the laser effect. A 00 curette was inserted into the tract, and the deeper tissue including the perilaryngeal area was debrided. The resulting tracts were lavaged using balanced electrolyte solution containing 0.01% povidone iodine solution via polyethylene tubing inserted through the endoscope channel and sterile cotton swabs inserted manually until the tracts appeared to be clean. Povidone iodine ointment was injected to fill the subcutaneous dead space, and the ventral skin incision was not sutured. All horses were prescribed phenylbutazone (2.2 mg/kg, q 12 h, PO), potassium penicillin (22,000 IU/kg, q 6 h, IV) and gentamicin (6 mg/kg, q 24 h, IV) for 10 days after surgery.

3. Results
All the visibly abnormal tissue was removed from all horses; hemorrhage was minimal. The total joules applied to each horse during surgery varied according to size and location of masses. In two cases, mucopurulent exudate was released into the airway after laser debridement. Most lesions involved the complete thickness of the affected cartilage. Horses were dismissed from the hospital shortly after the surgery, so local treatment was discontinued.

Re-examination revealed resolution of the lesions in all horses as evidenced by intact mucous membrane surfaces. Minimal superficial scarring was visible, and arytenoid mobility was present (see LLH below). Two of the racing Thoroughbreds and a show hunter have returned to work; another Thoroughbred was scheduled to begin training at the time of this writing. Lesions affecting the corniculate process (2) resulted in noticeable cartilage atrophy. One of those horses is racing, and one has just begun training. One racing Thoroughbred that had been previously affected with LLH was eventually retired due to a hypoplastic arytenoid cartilage muscular process and the resulting inability to sustain a prosthetic laryngoplasty.

4. Discussion
The diode laser efficiently vaporizes granulation tissue and sanitizes the tissue it contacts. The 600-μm fiber transmits efficient amounts of energy and has sufficient flexibility to reach the lesion, although larger-diameter fibers could be used. The 980-nm diode wavelength is absorbed moderately by tissue water, so it has a more rapid effect than an Nd:YAG laser. Endoscopically applied laser energy cannot be aimed directly onto the affected tissue in the tract making the manual direction via the ventral access more successful. Care must be taken when applying diode or Nd:YAG laser energy to tissue with underlying critical structures such as laryngeal cartilage. The energy is transmitted beyond visible tissue, and delayed complications may re-
Although power settings above 20 watts would vaporize tissue more efficiently, danger of deeper penetration would be increased. Laser energy should not be applied to unseen tissue within the tract because it will penetrate to peripheral critical perilyrngeal structures. The CO₂ laser administered through a waveguide would also be a suitable wavelength with little potential for deep penetration.

A curved curette is useful once the arytenoid cartilage is completely penetrated. The size should be selected to fit through the cannula to minimize soft tissue trauma and contamination. The cannula facilitates repeated entry through and minimizes trauma and contamination to the ventral laryngeal tissues. Infection from the contaminated airway could be introduced into the subcutaneous tissue of the throat latch region, although that complication didn’t occur in these 5 cases. Shortening of the cannula to more easily accommodate angled instruments may be useful.

This minimally invasive technique was adequate to facilitate cartilage healing and allow return of function for affected arytenoid cartilages that retained their basic architecture. Often the lack of motion and airway obstruction is a result of perilyrngeal swelling or possibly recurrent laryngeal neuritis, both of which may subside once infection is controlled.

One horse affected with LLH prior to occurrence of arytenoid chondritis was unable to return to work. During a prosthetic laryngoplasty surgery, it was discovered it had insufficient arytenoid muscular process to place a suture. Although the location of the previous infection and abscess was not immediately adjacent to the dorsal laryngeal region, any possible connection between the two conditions remains unknown.

A previous report describing endoscopically administered laser removal of laryngeal granulomas makes no mention of debridement of intra-cartilaginous tracts or drainage of abscesses. Not all cases in that series recovered. Infection in the relatively avascular cartilage tissue can be difficult to resolve, and no technique will succeed in all cases. However, when debridement is as complete as possible, the recovery rate should be improved. Previously, this author routinely performed partial arytenoidectomy on horses affected with arytenoid chondritis. That option remains should the described technique fail. The author concludes that laser-assisted debridement of septic tracts in the arytenoid cartilages that have not become completely deformed by the disease process is a reasonable procedure to restore athletic function.

Reference and Footnotes


3. LaserCare 50, ESC Sharplan Medical Systems, 250 First Ave, Needham, MA 02494-2814.