Brachycephalic obstructive airway syndrome (BOAS) in dogs

Part 1: Stenotic nares repair with a CO₂ laser

By Ziemowit Kudła, DVM, VAT; Poland, and Anna Mikolajko-Kudła, DVM
For the Education Center

The disrepair of airflow through the nose means that in order for the afflicted animal to inhale and achieve sufficient ventilation, it must increase the inspiratory effort to overcome the resistance generated by the upper respiratory tract obstruction. Following Bernoulli’s principle, the acceleration of the airflow through the narrowed nares due to the external pressure leads to the approximation of soft structures to each other and inward collapse of the stenotic nare.

Unlike brachycephalic dogs, most dogs with a mesoscopic head structure have nasal opening proportionally large to the size of their nares. In addition, during rapid breathing (due to excitement, exertion, etc.), mesoscopic dogs are able to actively open their nares, thus improving the flow of air through the nose, something brachycephalic dogs cannot do.

The rapid flow of air in brachycephalic dogs causes tremor of the soft palate, which gradually elongates and thickens. Thickening of the soft palate is another indicator of BOAS. Bronchoscopy, ventilation-depulmonary insufficiency, and the owner regarding surgical procedures to improve ventilation, it must increase the inspiratory effort to overcome the resistance generated by the upper respiratory tract obstruction. Following Bernoulli’s principle, the acceleration of the airflow through the narrowed nares due to the external pressure leads to the approximation of soft structures to each other and inward collapse of the stenotic nare.

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Brachycephalic obstructive airway syndrome (BOAS) in dogs
Part 1: Stenotic nares repair with a CO2 laser
By Zmiencki Kudla, DVM, DABVP, Poland, and Anna Nikolajdu-Kudla, DVM, For The Education Center

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Brachycephalic obstructive airway syndrome (BOAS) is a progressive disorder of the upper airway characterized by primary anatomical abnormalities (e.g. stenotic nares, elongated soft tissues, and a hypoplastic trachea) that increase resistance to airflow and result in respiratory distress. Restricted breathing in turn, may lead to pathological changes, such as: exertional nasal sauciness, pharyngeal hyperplasia, tonsillar hyperplasia, and eventual laryngeal collapse. Clinical symptoms of BOAS include snorting, snoring, stridor, dyspnea and may lead to deformation and dislocation of the upper respiratory tract obstruction. Following Bernoulli’s principle, the resistance to airflow increases with the square of the speed. As a consequence of BOAS, the upper respiratory tract becomes narrower. Over time it may lead to deformation and dislocation of the posterior nasal turbinates of the nasopharynx. This is particularly advantageous for the patient, inspiratory breathing, the extension of the inspiratory phase, and the decrease of the nose’s mouth leads to cause inspiratory inspiratory breathing to be observed. A common growing problem in dogs affected by BOAS is nasal deformation due to an overly large skin fold over the nose, which occurs mainly in pugs (Figure 1). This article mainly focuses on the problem of abnormal airflow through the nose and surgical treatment in stenotic nares.

Stenotic nares repair—CO2 laser procedure
When assessing a dog for BOAS at our clinic, we administer propofol (0.5–1.0 mg/kg IV) to promote immediate sleep without anesthesia. If BOAS is diagnosed, the patient is anesthetized and intubated. In the operating room, the owner regarding surgical procedures to be performed, possible complications, and education that cannot be repaired (Figure 2). Traditional technique of surgical repair of stenotic nares typically involves cutting the surface fragments of the nose cartilage as shown in Figure 3. In our experience, such a procedure provides little improvement and it does not address the problem of nasal deformity since the nose does not resolve lack of necessary mobility in the nasal area to increase the air to increase the air pressure. We have observed that shortly after a stenotic nares repair procedure is performed, the inspiratory respiration remains or there is a slight improvement and the soft palate can be re-aligned within two years post-op. This leads to the suspicion that a new condition is insufficient to address the nasal deformity. After 12 years’ experience treating and observing BOAS patients before and after treatments, and attending lectures by well-known veterinarians (Daniel A. Koch, DVM, Diplomate ECVS [European College of Veterinary Surgeons] and Blair Galanty, DVM, DPhD), we had a wider prospective of the problem and decided to introduce some modifications to the standard and current surgical procedures.

The first modification in stenotic nares repair is a vertical cut in a rhombus shape (Figure 4). For the procedure, we use a flexible CO2 fiber laser (Aesculight, Bothell, Wash.) at 15 watts of power in the continuous wave, SuperPulse mode. The adjustable handpiece is set to 0.25-mm focal spot size. Another modification is the cutting the tissue deeper to remove the surrounding cartilage. This is done in the cartilage made nasally without disturbing the nasal mucosa (Figure 5). The technique of the rhombus depends on the severity of stenosis, in width is adjusted to obtain the best nasal opening after surgery. The dog is given antibiotics and non-steroidal anti-inflammatory drugs during the healing period. The patient wears an e-collar until sutures removal. Owners often observe an accumulation of snot at the incision sites three to five days after the procedure (Figure 6). The dog is allowed to return to its regular activity and slow the discharge that clogs the nasal openings by gently rinsing and washing with water, saline solution, or hydrogen peroxide. The scar created following the CO2 laser procedure heals without any problem, which is different from the removal of the sutures. One to three months after laser repair of stenotic nares, nose pigmentation is completely restored and the surgical site is virtually invisible (Figure 10).

Conclusion
For seven years, I have been performing treatments with the Aesculight CO2 laser. Over this time, I developed a method of deep vertical cutting that yields the best results for stenotic nares repair. Thanks to the laser’s ability to cut and coagulate simultaneously, the stenotic nares procedures are now feasible, especially compared to the traditional scalpel (Figure 11). A side-by-side comparison of an Asclertech laser incision and a scalped incision. If an owner comes to us with a dog that snores, has a strong dyspnea, and an elongated soft palate, the question is whether it is always necessary to perform the surgery on the nose. The answer is yes, it is. When we consider it in terms of Bernoulli’s principle and a disorder of the airway through the nose, then it will be an elongation of the soft palate and further consequences associated with BOAS. An exception to this situation is the presence of another disturbance of airflow through the nose, such as nasal polypos, nasal, cartilage or deformation after injury (i.e. biting or traumatic injury). Therefore, if the respiratory tract (nasal and oropharynx) persist despite previous stenotic nares surgery, it is worth re-examining the case from the very beginning. It could be the nose may still be too narrow or it might be necessary to perform another type of nasal examination (rhinorhaphy, CT-SBUS) to detect unusual obstructions of airflow in the nasopharynx.

The future health and well-being of BOAS-prone breeds depend on veterinarians. During the first preventive period or significantly impact airflow. It is best to remove the discharge that clogs the nasal openings by gently rinsing and washing with water, saline solution, or hydrogen peroxide. The scar created following the CO2 laser procedure heals without any problem, which is different from the removal of the sutures. One to three months after laser repair of stenotic nares, nose pigmentation is completely restored and the surgical site is virtually invisible.

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FIGURE 1
An example of what the process of evaluation for BOAS looks like.

FIGURE 2
Deep-out of the nose cartilage with the Aesculight CO2 laser.

FIGURE 3
Viewed of the horizontal nares after the traditional surgical repair (when and the surface fragments of the nose cartilage were removed).

FIGURE 4
Skin folds over the nose of a pug.

FIGURE 5
An example of what the process of evaluation for BOAS looks like.

FIGURE 6
Skin placed on the nose. Note the substantially increased nasal opening, as meiosis is pulled up in nose.

FIGURE 7
FIGURE 8
FIGURE 9

FIGURE 10
Sutures on the nose after surgery.

FIGURE 11
Small scabs on the nose that appear during healing.

REFERENCE

The Education Center 2019 article was sponsored by Aesculight of Bothell, WA, manufacturers of the only commercially available CO2 laser.

Anna Nikolajdu-Kudla, DVM, was born in Poland, Bielsko-Biala, Poland, which they continue to this day. Nikolajdu-Kudla works mainly in the fields of anesthesiology, hematology, and dermatology of dogs and cats. She is the author of several publications in the national press on hematology. Kudla has participated in many conferences, workshops, and courses as a speaker and lectured on the use of CO2 laser in veterinary surgery and veterinary histopathology in Poland. She runs first-aid veterinary courses and courses for dog owners. In 2018, she graduated from the Veterinary school of Anna Nikolajdu-Kudla, DVM. Looking for new solutions in veterinary medicine, Dr. Kudla purchased an Aesculight, the first CO2 laser offered in Poland. Since 2012, she has had all surgical procedures in her practice to laser surgery. Kudla is the author of several publications on the national press on the use of the Asclertech laser in veterinary practice. He has participated in many conferences, workshops, and courses as a speaker and participant, and lectured on the use of CO2 laser in veterinary surgery and on veterinary cardiology in Poland. He now runs veterinary anesthesia and courses for dog owners. In 2018, Kudla graduated from the Veterinary Anesthesiology and Management of canine brachycephaly in Animals. 2019 Jan 10.3390/ani9010003.

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