# **Dealing with your brachycephalic patient**

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Brachycephalic dogs (BD) are a group of breeds that share similar cranial anatomy. They are characterized by “severe shortening of the muzzle, and therefore the underlying bones, and a more modest shortening and widening of the skull”.[1](#_ENREF_1" \o "Bannasch, 2010 #651) BD are popular; veterinarians are therefore likely to be managing these patients and their associated disorders. When extreme, their anatomy makes them prone to increased inspiratory resistance to flow; this is termed the brachycephalic obstructive airway syndrome (BAOS).

BAOS results from an elongated soft palate, stenotic nares, edematous tonsils, laryngeal edema, everted laryngeal saccules, laryngeal collapse, nasal turbinates protruding into the pharynx, edema of the epiglottis, and hypoplastic trachea. Clinical signs related to BAOS include snoring, inspiratory dyspnea, exercise intolerance, cyanosis and, in the most severe cases, episodes of syncope.2

1. Recognition of upper airways obstructive crisis

Brachycephalic breeds in upper airways obstructive crisis are presented for inspiratory dyspnea associated with excessive noisy breathing. Inspiratory dyspnea is exacerbated by exercise and augmentation of the ambient temperature. Auscultation of the lung field is difficult because of enhanced upper airway sounds.

As gastrointestinal abnormalities are very commonly associated with BAOS2,3, dogs can have history of vomiting or regurgitation. So BAOS signs could be exacerbated by concurrent aspiration pneumonia. Many of these animals have a high potential to decompensate and develop acute respiratory distress. Therefore, they must be handled carefully to prevent stress and acute decompensation. It is important to keep the animal calm and in a cool environment. Supplemental oxygen is required.

1. Supplementation in oxygen

The mainstay of therapy for the respiratory distress patient is oxygen administration and should be instituted as soon as distress has been identified. Multiple options are available, each carrying advantage and limitations.

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| **Oxygen administration technique** | **Advantage** | **Limitations** |
| **Flow-by** | * Easy to implement | * Might stress patient * Limited FiO2 |
| **Face mask** | * Easy to implement * Higher FiO2 | * Might stress patient |
| **Elizabethan collar** | * Higher FiO2 | * Might stress patient |
| **Nasal prongs** | * No operator required * Allows transport | * Hard to maintain * Nasal irritation |
| **Nasal cannula** | * No operator required * Allows transport | * Nasal irritation |
| **Oxygen cage** | * Minimizes patient stress * Higher FiO2 | * Limited to no patient access |
| **Intubation** | * Maximizes FiO2 * Airway protection | * Requires general anesthesia if the patient is not comatose |

For brachycephalic patients, flow-by, nasal cannula and intubation for severe respiratory distress are the best suited techniques.

1. Post extubating period

Post extubating period is critical in BD. Nursing is a tremendous part of the management of BD at the time of extubation. In the author’s practice it is common for an Intensive Care Unit or Anesthesia staff member to maintain the patient’s mouth open while pulling the tongue forward. Preparedness is also key: emergency re-intubation supplies should be readily available (laryngoscope, endo-tracheal tube, stylet, anesthesia drugs, oxygen source).

The use of naso-tracheal tube (NTT) has recently been retrospectively studied in BD following BOAS surgical treatment4. A NTT was placed prior to anesthesia recovery and humidified oxygen was then administered as needed in the recovery phase. The device appeared safe, nonetheless it was perceived to be associated with vomiting, regurgitation, or coughing in some dogs. Interestingly, 5 patients without the NTT experienced respiratory distress in the post-operative period while no dog with a NTT displayed similar signs. In the author practice, NNT is placed before extubation of high risk patient, and seem to be well tolerated.

High flow oxygen therapy, a fairly new device might prove helpful in managing BD in the post-extubation period. This innovative device relies on high-flow (up to 40 L/min) delivery of warmed and humidified oxygen through nasal prongs. The oxygen concentration (or fraction of inspired oxygen, FiO2) can also be precisely controlled with this device. The high flow provided by the machine is used to create an “air-skeleton”, maintaining airway patency in patients prone to upper airway collapse (see proceeding “Advanced oxygen therapy techniques”).

1. Sedation

Sedation is a very important part of therapy for those patients and should be done at the same time as oxygen therapy. It allows for decreasing agitation as well as inspiratory effort therefore preventing turbulent flow, which prevents adequate breath intake. Sedation should be done immediately at admission, with oxygen therapy. Drugs commonly used in the authors practice are acepromazine (5-10 microgrammes/kg IV), butorphanol (0.3-0.5 mg/mg IV) and dexmedetomidine (1-3 microgrammes/kg IV). Dexmedetomidine could also be used as a CRI in order to keep the patient quite after initial stabilization (1-3 microgrammes/kg/h CRI). Some patients might even require general anesthesia and trans-oral tracheal intubation. In that cases, rapid induction agent should be preferred (e.g. propofol or alfaxolone).

1. Temperature control

Dyspneic brachycephalic patients are often rapidly hyperthermic. Hyperthermia stimulates panting, which in turn favors turbulent airflow upon inspiration. Temperature control is therefore important in BD facing an obstructive crisis. Association of sedation (or intubation), treatment of laryngeal edema and active cooling is efficient. The author’s practice commonly resorts to the use of fans. Patients may also be actively cooled off if the rectal temperature exceeds 39.5°C.

1. Decrease upper respiratory tract inflammation

If there is no contraindication, corticosteroids can be injected as soon as possible to limit laryngeal edema associated with respiratory distress. Dexamethasone at 0.1 mg/kg IV is very interesting.

Inhaled corticosteroids can also be administered if tolerated by the patient. Fluticasone and budesonide are the 2 most used inhaled corticosteroids. Hypertonic saline has anti-inflammatory and anti-edematous properties and is used with success in the author institution to decrease respiratory distress.

1. Decrease airway fluid accumulation

Brachycephalic patients are prone to aspiration pneumonia and airways mucus accumulation. Respiratory nursing care and chest physiotherapy techniques are very important, especially in the post-extubation period. New chest physiotherapy techniques will be described in this lecture.

1. Before discharge

Brachycephalic patients are prone to stress and respiratory distress. Some recommendation can make the travel safer:

* Discharge as soon as possible
* Do not hesitate to sedate them for the travel
* Ask owner to be ready: air conditioner in the car, not at hottest time of the day
* Keep them fit

Conclusion: Brachycephalic dogs are popular dogs. Those suffering from BAOS might prove challenging in the emergency room and the intensive care. Being prepared to known common respiratory problems is key to the successful management of those patients. Decreasing upper airway inflammation and maintaining airway patency is the corner stone of caring for airway obstructive crisis. BAOS should be regarded as a systemic disorder rather than a problem only affecting the upper airway.

**References**

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