

**BRACHYCEPHALIC AIRWAY SYNDROME,
PART 3: SUCCESSFUL ANESTHESIA AND
RECOVERY**

Gerhard U. Oechtering, Prof.Dr.med.vet., Dipl. ECVAA
 Michaele Alef, Dr.med.vet., Dipl. ECVAA
 Claudia Noeller, Dr.med.vet.
 Department of Small Animal Medicine
 University of Leipzig, Germany

In human anesthesia, "difficult airways" are a common problem for anesthetists and intubation is often challenging. In small animal medicine, problematic upper airways are a rare condition and in general, intubation is easy to perform – with one major exception: brachycephalic breeds.

Partial to subtotal obstruction of the upper airways is common in all these animals, although in varying intensity. The majority of these obstructions are clearly visible and easy to detect (Table 1), while others remain hidden and are unlikely detected during examination with the naked eye (Table 2). To aggravate the situation, a number of animals are very susceptible to any form of stress. Even minor necessary manipulations during preanesthetic evaluation, induction, or recovery can lead to critical situations.

PREANESTHETIC EVALUATION

To judge the clinical relevance of upper airway obstruction, even a thorough clinical evaluation might not provide a true picture of the situation. Specific questions aiming at symptoms in the context of the brachycephalic airway syndrome may be of additional value (Table 3).

Auscultation of heart and lungs may be difficult due to stridulous breathing. Some animals react even on the stress of the examination with respiratory signs. In these cases, we should restrict the examination to the bare essentials. If there is a known history of syncope, a thorough cardiologic examination is advisable to distinguish respiratory from cardiovascular causes.

PREMEDICATION

A sedative premedication is controversial. Too much sedation can lead to a reduction of respiratory reactivity towards hypoxia and hypercapnia and also can cause an increased collapsibility of the nasopharyngeal region. An intravenous catheter is mandatory but can also present a challenge of its own with an increasingly excited animal with worsening respiratory distress and a very tough skin covering small peripheral veins.

While restraining these animals, it is an absolute must to avoid all pressure or tension towards the neck or throat as well as any flexion of the neck that could compromise oral, nasopharyngeal, or laryngeal airways.

INDUCTION

Generally speaking, we regard all anaesthetics used in modern small animal medicine as suitable. Safety in brachycephalic anaesthesia in our opinion is not primarily a question of selecting the "right" drug but depends on experience of the anesthetist with the

particular drug and above all on the appropriate and correct handling of the brachycephalic animal in every stage of the procedure.

Table 1. Upper Airway Obstructions in Brachycephalic Breeds that are Easy to Detect

- Stenotic nares (cranial stenosis)
- Macroglossia
- Overlong soft palate
- Enlarged tonsils
- Everted lateral laryngeal ventricles (Laryngocele)
- Collapsed or dysplastic larynx

Table 2. Hidden Upper Airway Obstructions in Brachycephalic Breeds

- Stenotic nares (caudal part, at the transition from vestibulum to the cavum nasi)
- Hypertrophic and dysplastic turbinates obstructing the main intranasal airways
- Caudal aberrant conchae – obstructing the choanae and the postnasal space
- Hypertrophy of the middle and rostral parts of the palatum – obstructing the nasopharyngeal space
- Hyperplastic and oedematous mucous membranes of the nasopharynx – resulting in marked collapsibility of the nasopharynx
- Tracheal obstructions: Hypotrachea or collapsed trachea
- Bronchial obstructions – Bronchial collapse

Table 3. Anamnesis in Brachycephalic Animals

- At what age did you observe the first respiratory symptoms?
- Describe the amount of exercise that is needed to provoke respiratory signs or signs of exhaustion.
- Describe the amount of excitement or stress that is needed to provoke respiratory signs.
- At which temperature range do symptoms begin to aggravate?
- Is there evidence of syncope - during exercise or even at rest?
- Is there snoring only during sleep or all day long?
- Is there evidence of sleep apnea?
- Describe the worst respiratory situation so far.

Improper positioning during induction or recovery can easily cause dramatic airway occlusion. For example, a

"normal" sternal position in the unconscious unintubated animal with its head and chin on the table can kill the patient. In these dogs, even slightest external pressure against the base of the tongue or throat can occlude oral and nasopharyngeal airways completely.

INTUBATION

Intubation in brachycephalic animals is not without its problems. A procedure that is comparatively easy in normocephalic dogs can be challenging even for the experienced. The relatively large outer diameter of the head-neck transition stands in sharp contrast to the inner diameters of pharynx, larynx, and trachea. To make the situation worse, these narrow regions seem to be filled with redundant soft tissue originating from palatinal, pharyngeal, and laryngeal mucosa. In addition to that, the huge root of the tongue occupies vital space of the airways, predominantly in bulldogs. Table 4 lists some helpful points for intubation of brachycephalic dogs.

Table 4. Points for Successful Intubation in Brachycephalic Dogs
<ul style="list-style-type: none"> • Plane of anesthesia deep enough • Fully straightened neck (trained assistant) • Laryngoscope with long and curved blade (large base of tongue) • Bright light source • Suction device for saliva and mucus (gentle negative pressure to avoid damage to vocal folds) • Tubes of different sizes, also those supposed to be too small – better a small one in place than failed with the proper one

VENTILATION

Especially in critical patients, it is advisable to ventilate the animal. This can be performed manually or with ventilators via the conventional endotracheal tube; the use of masks is not recommended. A very interesting alternative to conventional ventilatory techniques is the use of jet ventilation, either with automatic ventilators or a manual device (<http://www.vbm-medical.de/cms/108-1-jet-ventilation.html>). This enables the use of very small endotracheal catheters (10 F) both during intralaryngeal surgery and also during recovery. One has to keep in mind, that this technique provides no protection against aspiration and if laser surgery is used, particular attention has to be paid that oxygen concentration does not exceed 40 Vol%.

MONITORING

Continuous monitoring of expired carbon dioxide (capnography) and oxygen saturation (pulse oximetry) are very useful tools for respiratory monitoring. In brachycephalic breeds, sudden episodes of bradycardia are not uncommon; therefore, continuous ECG monitoring is also advisable.

MAINTENANCE

Maintenance of anaesthesia does not differ appreciably from anesthetic techniques in normocephalic dogs.

RECOVERY (Table 5, Figure 1)

Table 5. Recovery from Anesthesia in Brachycephalic Dogs

- | |
|---|
| <ul style="list-style-type: none"> • Extubate as late as possible. • Use a maxillary sling (Figure 1) or spread jaws with simple bite block. • Avoid any external pressure against the base of the tongue or throat. • Be prepared for emergency re-intubation. |
|---|



Figure 1. Maxillary sling during recovery.