

BRACHYCEPHALIC SYNDROME

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Technicians play a key role in facilitating effective treatments to patients suffering from Brachycephalic syndrome. *Brachycephalic airway syndrome (BAS)* is a condition affecting short-headed dogs and cats. These patients may suffer from stenotic nares (narrowed nostrils), elongated soft palate, nasopharyngeal turbinates, everted laryngeal sacculles, hypoplastic trachea, and laryngeal collapse. Pug, pekinese, maltese, boston, shih tzu, and bulldogs are common canine breeds affected, and the persian and himalyan are among the cats. The symptoms are classic of other upper respiratory conditions, including inspiratory stridor and stertorous breathing, cyanosis, hyperthermia, exercise intolerance, excitability, leading to collapse in severely affected patients. Owner may also report coughing, gagging, and vomiting.

Often patients suffering from an upper airway disease will arrive to the clinic in respiratory distress, with cyanotic or pale mucous membranes. These patients will require supplemental oxygen administered by way of a facemask, nasal catheter, or oxygen cage. The oxygen flow rate should be 5-10 L/min when using a facemask to prevent build up of CO₂ in the mask. Another easy means for providing O₂, if an oxygen cage is not available, is plastic wrap over the end of a long e-collar, with a red rubber tube stuck into the e-collar. Nasal oxygen can be administered via a red rubber urinary catheter or feeding tube. They are inexpensive and ideal for large patients unable to fit into an oxygen cage. Many patient may object during the placement of the nasal catheter, and local anesthetic such as 2% lidocaine jelly, can be used to ease discomfort. Humidified air at a rate of 3-5 L/min is recommended for nasal oxygen therapy. When administering oxygen therapy the FIO₂ (fraction inspired oxygen), the percent of pure oxygen delivered to the patient during inhalation, needs to be considered. FIO₂ of 100% oxygen supplementation should not be maintained for greater than > 6 hours, due to possible oxygen toxicity. Oxygen toxicity compromises lung function leading to death of the patient. The FIO₂ should be ≤ 50%, to decrease the risk of oxygen toxicity. Humidification of the administered air is required during long term-oxygen therapy, to prevent dehydration of the airway which can lead to atelectasis and pneumonia.

Sedatives, such as acepromazine are often recommended to help relieve anxiety and excitement, as well as reduce the incidence of regurgitation. A complete physical exam, including auscultation of the chest and tracheal sounds, along with tracheal palpation is done on all patients. Right and left lateral, and ventrodorsal chest radiographs are taken to check for evidence of aspiration pneumonia or heart disease. Radiographs can be taken with the patient under light sedation, such as butorphanol (0.2-0.4 mg/kg) and acepromazine (0.01-0.03 mg/kg) given IM or IV and flow by oxygen delivered via face mask. Because there is a risk of vagal stimulation with many of these patients, an anticholinergic, such as atropine or glycopyrrolate (0.1 mg/kg IM), is given intramuscularly (IM) as a premedication to prevent bradycardia. Metoclopramide is used to help reduce the incidence of regurgitation. Brachycephalic dogs are predisposed to congenital GI abnormalities, such as hiatal hernias, pyloric stenosis, and esophageal deviation (Poncet et al 2005). Urethral prolapse has also been noted in BAS patients, English bulldogs are the most common breed affected.

Other considerations for technicians is to always use a laryngoscope during oral exams and intubations. Just because you are capable of intubating without the aid of a laryngoscope, it does not mean you should. Light is necessary in recognizing potential irregularity or irritations

of the oral cavity, that may be missed in the dark. Always have oxygen and a variety of endotracheal tubes (ETT) available when administering sedation to patients affected by airway disease, often the ETT size is overestimated for patients with hypoplastic tracheas. It is helpful to have a rigid stylet, such as a polypropylene urinary catheter, to aid in the intubations of cats or small dogs. Many of these patients are administered steroids, so nonsteroidal anti-inflammatory drugs, NSAIDS, should be avoided due to the risk of GI ulceration that can lead to gastric perforation.

Medical management is primarily targeted to reduce clinical signs. Dogs with exercise intolerance may need to be placed on a prescription reduced calorie diet to facilitate weight loss. It is imperative that owners understand the importance of maintaining a healthy weight.

When the airway is obstructed and the amount of air required by the lung is not achieved, the pressure on the area is increased. The increase in pressure acts like a vacuum and pulls on the surrounding tissues. Stenotic nares greatly reduces the amount of air the patient can breathe. Surgical treatment is required to resolve the clinical signs. The surgery option available for stenotic nares varies but the ultimate result is the same, a larger nasal passage. Surgical repair is recommended at 3 -4 months (Koch 2003) of age, but can be done as early as 9 weeks in clinically affected patients. The sooner stenotic nares are fixed, the less likely the patient will have to be treated for elongated soft palate and everted laryngeal saccules. This is particularly true for Shih Tzu, pugs, Boston's, Pekinese, Persians. An alar fold resection can be performed on really young dogs because the alar folds are too small to allow primary wedge removal and closure. Laser can be used, however the owner should be warned the nares will be white afterwards but will turn back to the original color (usually black) within 2-4 months.

Dogs with elongated soft palates will suck the soft palate back during inspiration, covering the larynx. A computed topography (CT) evaluation of the soft palates of brachycephalic breeds were shown to be thicker than non-brachycephalic breeds (Grand and Bureau 2005). The soft palate is considered too long if it hangs down 1-3mm below the level of the epiglottis. During a soft palate resection surgery the patient is intubated, positioned in sternal recumbancy and the head is elevated so the mandible (lower jaw) can hang open. The redundant palatal tissue is excised, traditionally, by a cut and sutures technique, and a 4-0 monofilament absorbable suture (i.e. poliglecaprone 25) is placed to control hemorrhage (bleeding). Laser and radiofrequency cautery are both acceptable alternatives, often much faster than the traditional method and similar clinical outcomes. The room should be equipped with an air scavenging system, when using the alternative methods, to pull the smoke away from the surgical team. Safety eye protection needs to be worn by all the members of the surgical team, including anesthesia, with the use of the laser.

Laryngeal saccules are located behind the arytenoid cartilages, and when everted they block the opening of the larynx. The surgeon may elect to remove the saccules if they are significantly blocking the airway. Often the patient needs to be extubated for this procedure, so IV anesthetics (i.e. Propofol) should be available during this procedure. The surgeon can simply remove the saccules with long scissors or cup-biopsy forceps. Nasopharyngeal turbinates can be ablated with a laser by way of an endoscope, however it is difficult and is not routinely performed. There is no surgical treatment for hypoplastic trachea.

BAS patients are at risk for aspiration pneumonia when heavily sedated. In dogs the aspiration can be silent, so a rapid recovery and late ETT extubation is recommended. If there are any concerns, the patient's neck is shaved and prepped in case an emergency tracheostomy is needed. Owners are instructed to use an Elizabethan collar to prevent facial rubbing after

surgery. The E-collar may need to be removed if the dog has a heavy neck and it makes them gag. The E-collar should still be sent home with the owner. If the palate had been shortened instruct the owner to feed canned food for two weeks until the palate is healed. Steroids; prednisone (0.5-1.0 mg/kg PO) or dexamethesone (1 mg/kg IV) is given to decrease edema and inflammation after surgery. Typically antibiotics are not indicated. The outcome is favorable in young dogs when treated early, to correct upper airway problems due to BAS.