

Brachycephalics: It is More Than Just a Short Nose

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Respiratory diseases as well as respiratory distress are common complaints in dogs. Due to unique breed characteristics, including anatomic features, there is a breed predilection for many conditions. In no case is this more evident than in dogs with brachycephalic (BC) confirmation. BC dogs are prone to a variety of conditions associated with chronic hypoxemia and increased intra-thoracic pressures including not only respiratory obstruction, but also heatstroke, gastrointestinal disease, and heart-based tumors. Some evidence supports as well an increased tendency towards hypercoagulability and some dogs have a syndrome that is similar to sleep apnea.

Respiratory

Upper airway obstruction is a common and occasionally under-recognized source of respiratory distress. As an overview, dogs with upper airway obstruction will have noisy breathing that worsens with exercise or heat exposure. Normal inspiration results in negative pressure inside the upper airways, which causes collapse of weaker or less supported tissues. Recurrent obstruction contributes to tissue swelling and edema, which further magnifies obstruction. Heat stress, which leads to panting, is associated with higher inspiratory flow rate, which may require more work of breathing due to partial airway obstruction, which results more muscle activity and paradoxically further overheating. Specific upper airway disease includes brachycephalic obstructive airway syndrome (BAS), and laryngeal paralysis. Rhinitis may also contribute to airway obstruction, as dogs are preferential nasal breathers, particularly at rest. The brachycephalic dog, and the bulldog in particular are particularly affected with upper airway obstruction.

All bulldogs have some component of BAS. Classic features include stenotic nares, long/thick soft palate, everted laryngeal sacculles, tracheal hypoplasia, and in some dogs laryngeal collapse or nasopharyngeal turbinates.(1,2) Pharyngeal edema and collapse may also occur with prolonged obstruction.

Treatment of bulldogs includes early conversation with the owners of bulldogs, and consideration for surgical palliation with soft palate resection and/or stenotic nares resection. (2) Many owners assume exercise intolerance and stertorous breathing are normal, and may be reassured that surgery will typically result in marked improvement in quality of life, particularly if performed early in life. Long-standing obstruction will result in increased pharyngeal soft tissue weakness, and may potentially result in less improvement after palliative surgery than if done earlier in life. Surgical palliation may be successfully performed in practice by the interested clinician or by a surgeon, either using a laser or hand-suturing techniques. (2). Permanent tracheostomy may be required in severely affected dogs. (figure 1)

Pneumonia in adult brachycephalic dogs is usually due to aspiration. Aspiration may be sterile (eg. Chemical) but more classically appears to be bacterial. Bulldog puppies are also commonly affected with community-acquired pneumonia, particularly when shipped in a long distance.

Treatment of aspiration/bacterial pneumonia requires first the clinical recognition. Common signs include lethargy, cough, tachypnea or respiratory distress and occasionally nasal discharge. Routine thoracic radiographs will document alveolar infiltrate, most common in the right middle lung. Severe pneumonia may affect all lung lobes, while early changes may be primarily interstitial in nature. As in all radiographic interpretation it is wise to completely evaluate the ribs, sternum, pleural space, cardiac silhouette as well as any areas of the neck or abdomen that are visible. Bulldogs in particular may have tracheal hypoplasia, which may impact clearance in pneumonia.

Broad spectrum antibiotics, ideally based upon culture and sensitivity testing are advised. Collection of samples for airway washes may be challenging in brachycephalics; transtracheal washes are typically hard to successfully obtain in BC dogs, so transoral washes are preferable. Pending culture results, good combinations include enrofloxacin and ampicillin or Cefazolin-gentamicin-metronidazole. Other combinations are certainly acceptable as well, as long as there is adequate gram-positive, gram-negative and anaerobic coverage. Other essential care includes intravenous fluids for hydration, and supplemental oxygen if shortness of breath is present. Oxygen therapy is useful to reduce the work of breathing, improve patient comfort (eg. Decrease air hunger) and improve tissue oxygenation. The duration of antibiotic therapy is dependent on clinical course. In veterinary medicine, some clinicians advocate treatment for 4 weeks at least, plus until evidence of radiographic resolution of the infiltrates. In human medicine, treatment duration tends to be shorter; this may ultimately be advisable for our patients as well.

Anesthetic complications

Brachycephalic dogs are prone to anesthetic concerns, specifically difficulty with regurgitation and extubation. In general, while intubated these dogs are happy! However, during recovery,

vomiting or regurgitation may be common due to swallowed air, and airway swelling may accompany intubation. Guidelines for bulldogs include: Fasting to avoid a full stomach and pre-treatment with metoclopramide (Reglan) is wise. For elective surgery, pre-treatment with omeprazole is ideal if possible. Intubation requires a good light source, and ideally to have success confirmed with end-tidal CO₂ assessment. The tube should be maintained for as long as possible post operatively and the BC should not be left to recover unobserved. (Figure 2)

Hospital acquired distress

Bulldogs and other brachycephalics are also very prone to decompensation in the hospital due to the stress of hospitalization and occasionally handling. Excessive stertor should be treated before airway obstruction develops and all lay staff should additionally be educated on upper airway disease.

Cardiac disease

Bulldogs are also predisposed to two types of cardiovascular disease, the first being arrhythmogenic right ventricular cardiomyopathy (ARVC); this is similar to the boxer cardiomyopathy, where often more of the disease reflects ectopy, rather than myocardial dysfunction. Bulldogs are notoriously hard to auscultate due to upper airway sounds, and thoracic radiographs are hard to interpret. Treatment

Bulldogs (and other BC breeds) are also prone to the development of heart based tumors (not hemangiosarcoma) which may result in exercise intolerance or syncope for compression of the pulmonary artery or pericardial effusion. Xrays will again be hard to interpret, and jugular venous distension is hard to appreciate in a bulldog. Diagnosis is by echocardiography.

Heat stress and gastrointestinal disease

Bulldogs are also prone to heat stress due to their inability to effectively cool and also are prone to gastrointestinal distress and esophageal dysfunction. GI distress may be reflective of aerophagia and intermittent hiatal hernias.^(3,4) Chronic therapy with a proton pump inhibitor, such as omeprazole (1 mg/kg or 20 mg/bulldog) may be helpful and can be considered in all bulldogs. Avoidance of obesity is also useful with many bulldogs benefitting from specific veterinary diet input to avoid maintaining extra weight.

Summary of Diagnostic techniques

A complete medical history and physical examination should be performed prior to sedated diagnostics in brachycephalic dogs. The location of disease or suspected disease should be established. For diagnostic testing that requires anesthesia or sedation, if possible, it is prudent to combine surgical or other palliative therapy with those diagnostics and avoid the “wake up and make plan”, especially for patients with compromised upper airways.

The major diagnostic testing options available

1. **Thoracic radiographs** – Radiographs are most helpful for dogs with suspected lower airway disease (eosinophilic bronchitis), pneumonia and pulmonary fibrosis as diagnostic tools, are useful to evaluate for concurrent pneumonia or hiatal hernia in bulldogs.
2. **Computed tomography** – Primary use is identification of pulmonary fibrosis. A lung biopsy is definitive, but less commonly performed due to costs, potential risks and current lack of therapeutic options.
3. **Oral examination** – Most useful in dogs with upper airway disease; Doxapram (1-2 mg/kg IV) may be useful to identify any dynamic collapse.
4. **Bronchoscopy** – Useful in tracheal collapse or tracheal hypoplasia
5. **Airway cytology and culture** – Useful for eosinophilic disease and excluding or establishing bacterial infections. Recall that colonization is common in the lower airways and a positive culture does not necessarily indicate infection.

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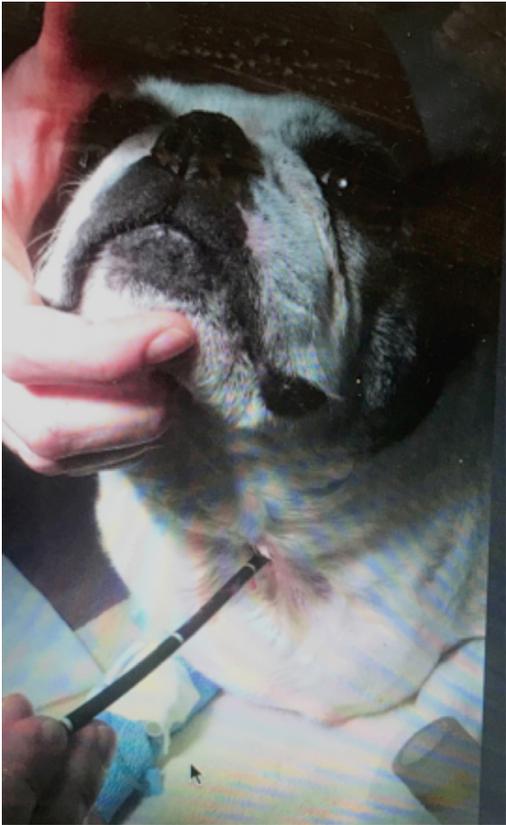


Figure 1.



Figure 2.