

BRACHYCEPHALIC AIRWAY SYNDROME

(UPPER AIRWAY PROBLEMS SEEN IN SHORT-NOSED BREEDS)

BASICS

OVERVIEW

- Partial upper airway obstruction in short-nosed, flat-faced (brachycephalic) breeds of dogs and cats caused by any combination of the following conditions: narrowed nostrils (known as “stenotic nares”); overly long soft palate; turning inside-out of a portion of the voice box or larynx (known as “everted laryngeal sacculles”), such that the space for air to pass through the larynx is decreased; and collapse of the voice box or larynx (known as “laryngeal collapse”)
- An abnormally small windpipe or trachea (known as “hypoplastic trachea”) often is present as well, and can worsen breathing difficulty (respiratory distress)

GENETICS

- No specific genes have been identified
- Short-nosed, flat-faced, broad (brachycephalic) head shape was initially an inherited defect in development of skull bones; has been perpetuated by selective breeding in certain breeds of dogs and cats

SIGNALMENT/DESCRIPTION of ANIMAL

Species

- Dogs and cats
- Common syndrome in brachycephalic breeds of dogs
- Cats—less likely to be severe enough to require treatment

Breed Predispositions

- Dogs—English bulldogs (most common), pugs, Boston terriers, boxers, Pekingese, Cavalier King Charles spaniels, shih tzu, Chinese shar pei, and others
- Cats—Persians and Himalayans

Mean Age and Range

- Young adults, most diagnosed by 2 to 3 years of age
- If diagnosed later than 4 years of age, another disease or condition may be adding to upper airway obstruction leading to diagnosis; older dogs may have a worse outcome postoperatively, but most have some improvement

SIGNS/OBSERVED CHANGES in the ANIMAL

- Snoring; high-pitched, noisy breathing (stridor); noisy breathing when inhaling (stertorous breathing)
- Rapid breathing (tachypnea), frequent panting
- Coughing and gagging, or difficulty eating and swallowing
- Inability to perform physical activity and worsening of condition during warm and humid weather
- Occasionally, fainting (syncope) and episodes of collapse
- Narrowed nostrils (stenotic nares)
- Increased breathing (respiratory) effort—may see pulling back of the lips with each breath, open-mouth breathing or constant panting, increased breathing rate, turning of the elbows away from the body (abduction of forelimbs) in an effort to open up the chest, increased abdominal effort during breathing
- If in severe breathing distress, may have increased difficulty in breathing while lying flat (known as “orthopnea”), even to point of reluctance to lie down; and bluish discoloration of skin and moist tissues of body (known as “cyanosis”)
- Increased body temperature (hyperthermia) may be present
- May appear anxious and resent or resist restraint

CAUSES

Brachycephalic airway syndrome results from inherited defects or developmental/growth defects of the upper airway. These defects include the following:

- Elongated soft palate—reported in up to 100% of cases in dogs
- Narrowed nostrils (stenotic nares)—reported in about 50% of cases in dogs; most common defect in cats
- Voice box or laryngeal disease—everted laryngeal sacculles and/or laryngeal collapse reported in about 30% of cases
- Abnormally small windpipe (hypoplastic trachea)

RISK FACTORS

- Brachycephalic breed
- Obesity—worsens airway obstruction; associated with poorer outcome following surgical correction; may contribute to backward or reverse flow of stomach contents into the esophagus (known as “gastroesophageal reflux”) and development of aspiration pneumonia
- Abnormally small windpipe (hypoplastic trachea) can result in diminished ability to clear mucus from the airway (decreased mucociliary clearance), worsened aspiration pneumonia, and increased airway resistance

- Warm, humid weather—increased panting can lead to fluid build-up (edema) in the tissues of the airway, further narrowing the airway opening, and leading to increased body temperature
- Exercise—dogs often are unable to exercise because of airway compromise and low levels of oxygen in their blood (hypoxia); forced exercise may lead to rapid development of overheating and collapse
- Excitement—can cause increased panting, resulting in fluid build-up (edema), increased airway obstruction, and increased body temperature
- Sedation may cause relaxation of the muscles of throat (pharynx) and soft palate, and may cause complete airway obstruction
- Sleep may cause relaxation of the muscles of throat (pharynx) and soft palate, leading to further airway obstruction
- Allergic reactions—acute allergic reactions causing build-up of fluid (edema) in the tissues of the airway may lead to airway obstruction
- Lung disease (such as pneumonia, pulmonary edema)—will cause additional breathing compromise
- Endocrine disease (such as low levels of thyroid [hypothyroidism] or high levels of steroid [hyperadrenocorticism or Cushing's disease])—could worsen weight gain and cause excessive panting

TREATMENT

HEALTH CARE

- No treatment necessary for patients without clinical signs
- Avoid risk factors
- Surgery recommended for patients with significant clinical signs
- Emergency presentation with animal in severe breathing distress requires rapid medical intervention
- Oxygen supplementation
- If patient has high body temperature (hyperthermia), should be cooled with cool water and by directing a fan to blow over the patient (increase convective heat loss); intravenous (IV) fluids should be administered, up to a shock rate if has an extremely elevated body temperature (greater than 106° F)
- If the airway is completely obstructed, the airway must be opened; this may be accomplished by passing an endotracheal tube through the mouth and into the windpipe (orotracheal intubation) and/or by a surgical incision into the windpipe (temporary tracheostomy)
- Dexamethasone can be administered to reduce inflammation
- Patients need 24-hour monitoring because of risk of acute airway obstruction and death
- Breathing rate and effort, heart rate, pulse quality, color of gums and moist tissues (mucous membrane color), time for pink color to return to gums after blanching them with one's finger (capillary refill time), temperature, and other physical parameters should be monitored
- Pulse oximetry and arterial blood gases to determine oxygen levels in the blood may be monitored, depending on severity of condition
- Intravenous fluids are administered at maintenance rate and handling and stress are minimized

ACTIVITY

- Usually self-limited by the animal
- Dogs should not be forced to exercise, especially in warm weather

DIET

- Weight loss is recommended for all overweight dogs and cats
- For obese, stable patients, weight loss is recommended prior to surgery

SURGERY

- Evaluation for elongated soft palate generally is performed under general anesthesia when the patient stable
- Surgical incision into the windpipe (temporary tracheostomy) can be performed to facilitate exposure or to treat airway obstruction
- Narrowed nostrils (stenotic nares) are corrected by surgically removing a wedge of the nasal tissue and closing the incision in such a manner to allow the nostril to be enlarged
- Elongated soft palate is treated by surgically removing a section of the soft palate using surgical scissors or carbon dioxide laser
- Everted laryngeal sacculles are treated by surgically trimming the tissue
- Permanent surgical opening into the windpipe or trachea (tracheostomy) may be necessary if severe laryngeal collapse is present

MEDICATIONS

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive.

- Dexamethasone to reduce fluid build-up (edema) and inflammation

- Broad-spectrum antibiotics are indicated if aspiration pneumonia is present, until culture and sensitivity results are obtained
- Omeprazole and cisapride may be beneficial in dogs with vomiting or regurgitation

FOLLOW-UP CARE

PATIENT MONITORING

- Postoperatively, 24-hour monitoring to observe for airway swelling and obstruction, which may require surgical incision into the windpipe (temporary tracheostomy)
- Breathing rate, effort, heart rate, pulse quality, mucous membrane color, capillary refill time, temperature, and other physical parameters should be monitored
- Understand clinical signs of breathing problems

PREVENTIONS AND AVOIDANCE

- Selection by breeders for dogs without severe conformational changes—may be difficult because breed standards encourage these structural changes
- Avoid risk factors

POSSIBLE COMPLICATIONS

- Overheating and heat stroke
- Aspiration pneumonia
- Death in about 10% of patients as a result of airway disease
- Most common postoperative complication is airway swelling and obstruction within the first 24 hours, may necessitate surgical incision into the windpipe (temporary tracheostomy)
- Continued breathing difficulty after corrective surgery
- Excessive shortening of the soft palate resulting in aspiration of food contents into the nasal cavity due to inability to close off the area between the nose and throat (known as the “nasopharynx”) during swallowing

EXPECTED COURSE AND PROGNOSIS

- Prognosis is good for improvement in breathing (about 60-80% of cases have good to excellent results following corrective surgery) but airway is still far from normal
- Prognosis better for dogs other than English bulldogs and for dogs that have correction of stenotic nares and elongated soft palate during same surgery
- Without surgery, prognosis is poor due to continued progression of brachycephalic airway syndrome
- Lifelong avoidance of risk factors recommended to decrease chance of developing clinical signs or worsening of disease

KEY POINTS

- Avoidance of risk factors is critical
- Dogs with brachycephalic airway syndrome are at increased anesthetic risk, and an even higher risk occurs if they also have obesity, cardiac disease, or aspiration pneumonia
- Corrective surgery often improves the clinical signs, but does not result in a completely normal airway
- The American Kennel Club will not allow a dog that has had surgery for stenotic nares or elongated soft palate to compete in AKC-sanctioned dog shows

