

CORRECTIVE SURGERY: Brachycephalic Airway Syndrome (BAS)

Associated Terms:

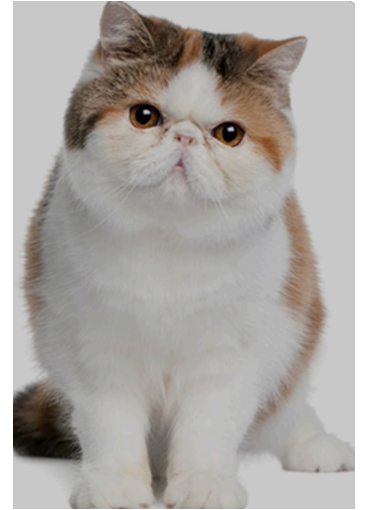
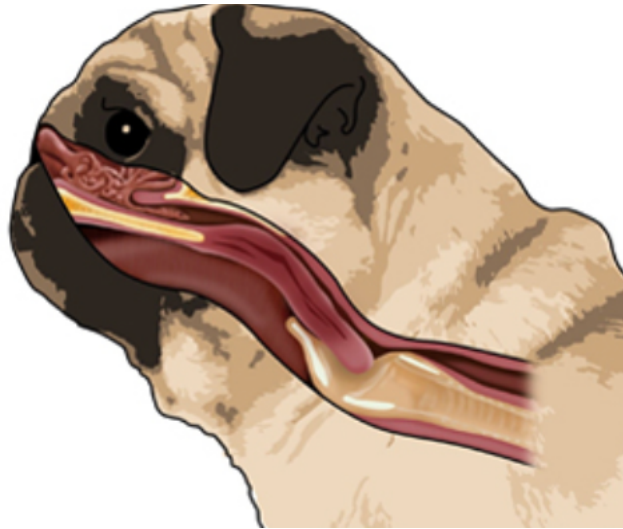
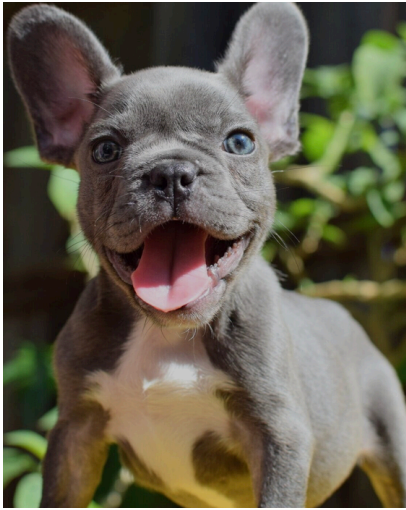
Short-Nose Breeds, Stenotic Nares, Pinched Nose, Elongated Soft Palate, Soft Palate Elongation, Everted Laryngeal Saccules, Laryngeal Collapse, Tracheal Hypoplasia, Hypoplastic Trachea



OVERVIEW

Certain breeds of dogs & cats are prone to difficult, obstructive breathing because of the shape of their head, muzzle & throat. The most common dogs affected are the “brachycephalic” breeds.

Brachycephalic means “short-headed.” Common examples of brachycephalic dog breeds include the English bulldog, French bulldog, Pug, Pekingese & Boston terrier. Common cats breeds include Persians, exotic shorthair, Burmese & Himalayan cat. These dogs & cats have been bred to have relatively short muzzles & noses &, because of this, the throat & breathing passages in these dogs are frequently undersized or flattened.



The term *Brachycephalic Syndrome* refers to the combination of elongated soft palate, stenotic nares & everted laryngeal sacculles, all of which are commonly seen in these breeds.

Elongated Soft Palate

Condition where the soft palate is too long so that the tip of it protrudes into the airway & interferes with movement of air into the lungs.

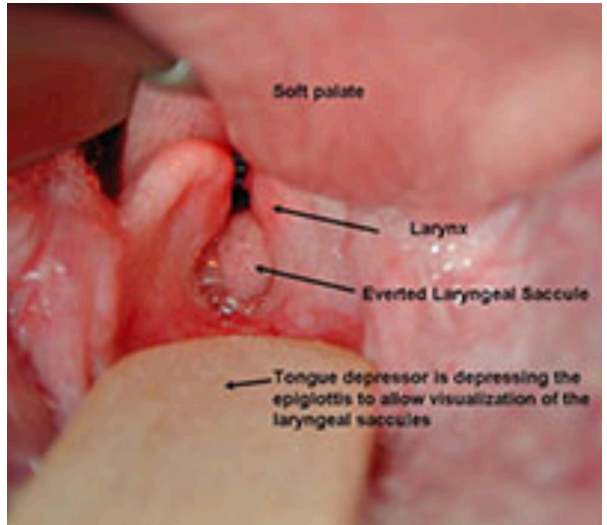
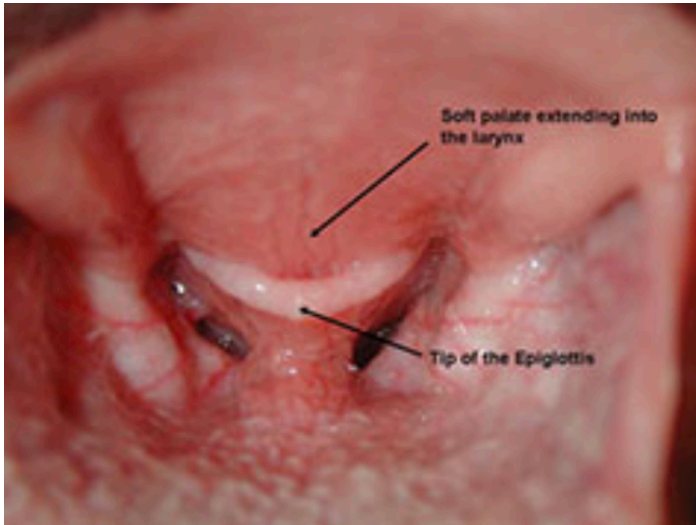
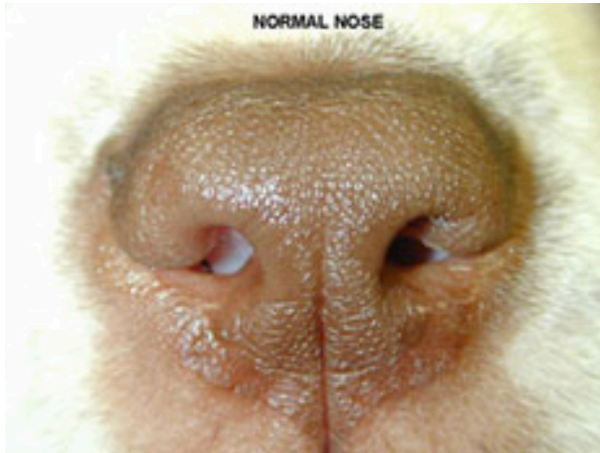
Stenotic Nares

Malformed nostrils that are narrow or collapse inward during inhalation, making it difficult for the dog to breathe through its nose.

Everted Laryngeal Sacculles

Condition in which tissue within the airway, just in front of the vocal cords, is pulled into the trachea (windpipe) & partially obstructs airflow.

Some dogs with brachycephalic syndrome may also have a narrow trachea (windpipe), collapse of the larynx (the cartilages that open & close the upper airway) or paralysis of the laryngeal cartilages.



SIGNS & SYMPTOMS

Dogs with elongated soft palates generally have a **history of noisy breathing**, especially upon inspiration (breathing inward). Some dogs will retch or gag, especially while swallowing. Exercise intolerance, cyanosis (blue tongue & gums from lack of oxygen) & occasional collapse are common, especially following over-activity, excitement, or excessive heat or humidity. Obesity will aggravate the problems. Many dogs with elongated soft palates prefer to sleep on their backs. This is probably because this position allows the soft palate tissue to fall away from the larynx. The signs associated with stenotic nares & everted laryngeal sacculae are similar.

If performed early, surgery & corrective procedures can prevent development of secondary changes associated with brachycephalic airway syndrome. Any tissue that obstructs the airway lumen is a source of resistance. According to the laws of physics, resistance in a single tube is inversely related to the radius raised to the 4th power. For example, if an airway is 50% obstructed, it is 16× harder to breathe.

Table 1. Abnormalities That Result in Upper Airway Obstruction

PRIMARY ABNORMALITIES	SECONDARY ABNORMALITIES
<ul style="list-style-type: none">• Stenotic nares• Elongated soft palate• Hypoplastic trachea	<ul style="list-style-type: none">• Everted laryngeal sacculae• Everted tonsils• Pharyngeal and soft palate edema• Laryngeal and tracheal collapse

For example, in puppies with stenotic nares it is recommended to perform rhinoplasty (stenotic nares surgery) at 4-6 months of age & at the same time perform a preliminary evaluation of the soft palate. Addressing these primary abnormalities at an early age may help avoid progression to secondary changes such as everted laryngeal sacculae or laryngeal collapse.

Table 2. Clinical Signs of Brachycephalic Airway Syndrome

<ul style="list-style-type: none">• Stertor and/or stridor• Inspiratory dyspnea• Increased respiratory effort• Exercise intolerance• Vomiting/regurgitation• Salivation• Syncope (severe cases)

DIAGNOSTICS

Stenotic nares can be **easily diagnosed on physical examination**. Definitive diagnosis of both elongated soft palate & everted laryngeal saccules can only be made with **the dog under anesthesia**. Generally, brachycephalic breeds have a thick tongue that makes visualization of the larynx in an awake animal very difficult. Attempts to restrain the patient & retract the tongue sufficiently to allow visualization of the larynx are generally unsuccessful. Under anesthesia, elongated soft palates extend past the tip of the epiglottis (the entrance to the airway). In severe cases the soft palate will extend directly into the laryngeal opening. The tip of the soft palate & the edges of the larynx are often inflamed (swollen & red). In chronic cases, the cartilages of the larynx become inflexible & begin to collapse, further narrowing the airway. Everted laryngeal saccules look like blue-gray soft tissue masses protruding into the airway just in front of the vocal folds. Your primary care veterinarian may also recommend chest x-rays to evaluate your pet's lower airways & lungs.

TREATMENT (SURGICAL OPTIONS)

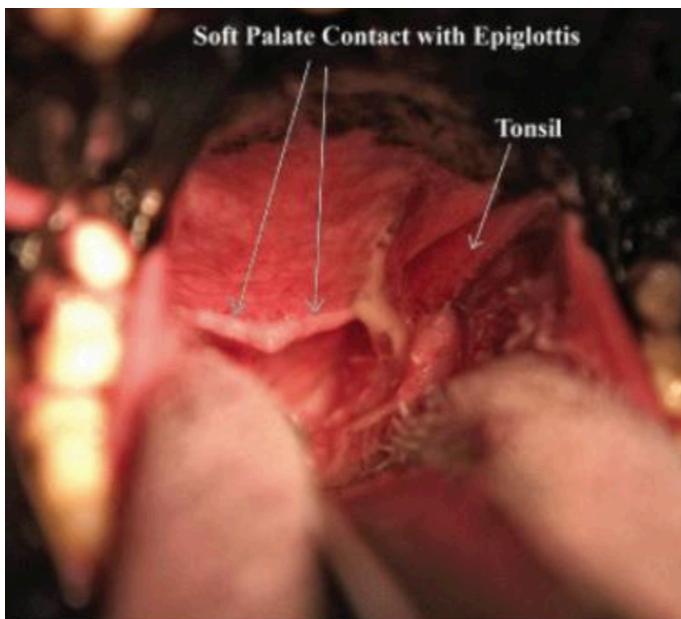


Figure 3. Intraoral photograph of an elongated soft palate and everted palatine tonsil.

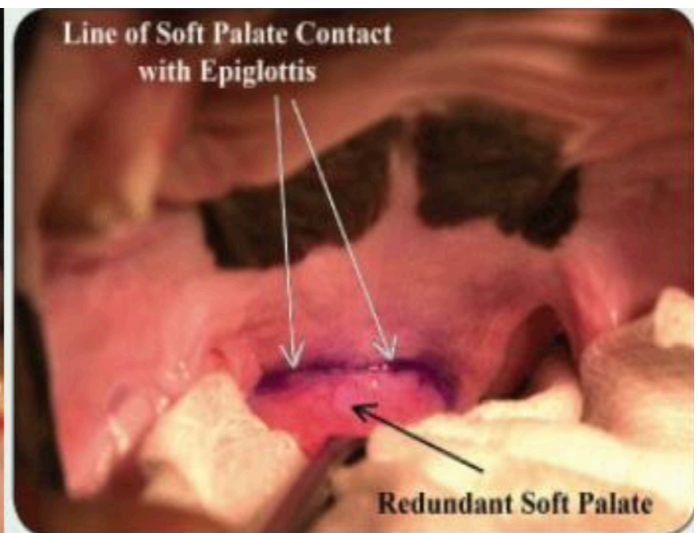


Figure 8. Intraoral photograph of the line where the soft palate and epiglottis touch; note the redundant soft palate being grasped and retracted rostrally.

Soft palate **abnormalities should be treated if they cause distress to your pet**, become more severe with time, or cause life-threatening obstruction. If your pet shows gagging, coughing, exercise intolerance, or difficulty breathing, resection of the excess soft palate may be necessary. Soft palate resection (staphylectomy) is performed using a scalpel blade, scissors or CO2 laser. The palate is stretched & the excess tissue is removed with blade or scissors.

If the laryngeal saccules are everted, they may be removed at the same time as the soft palate resection, or they may be left in & allowed to return to a more normal position. Correction of stenotic nares, if present, helps improve breathing & is done at the same time.

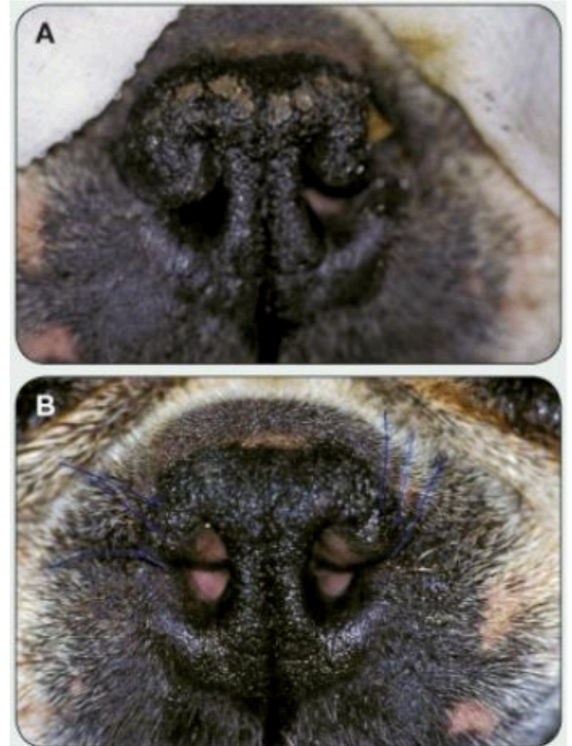
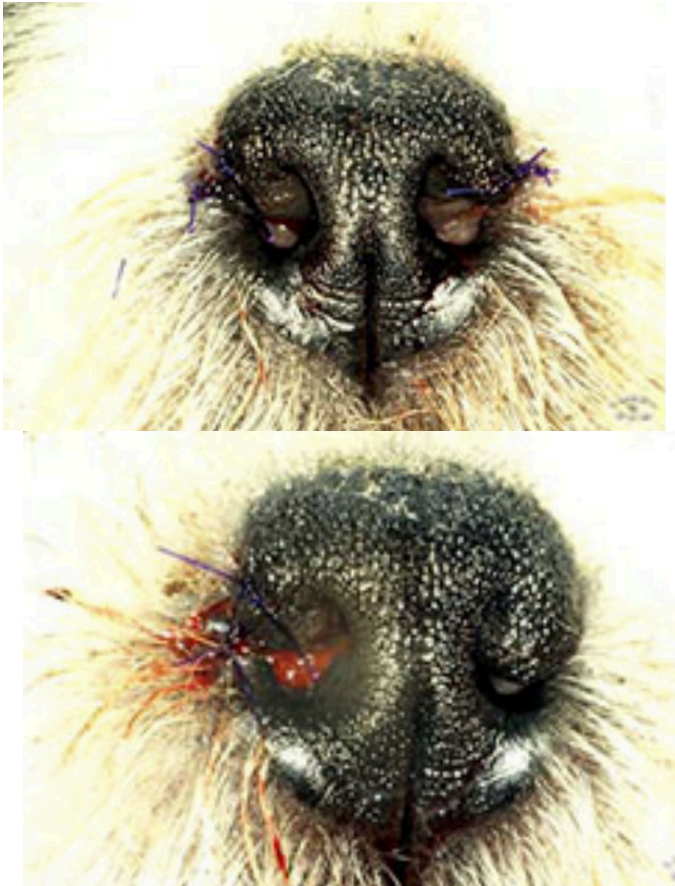


Figure 6. Nares that have been repaired using the wedge resection method; note how the postoperative diameter of the nares (B) has increased compared with the preoperative diameter (A).

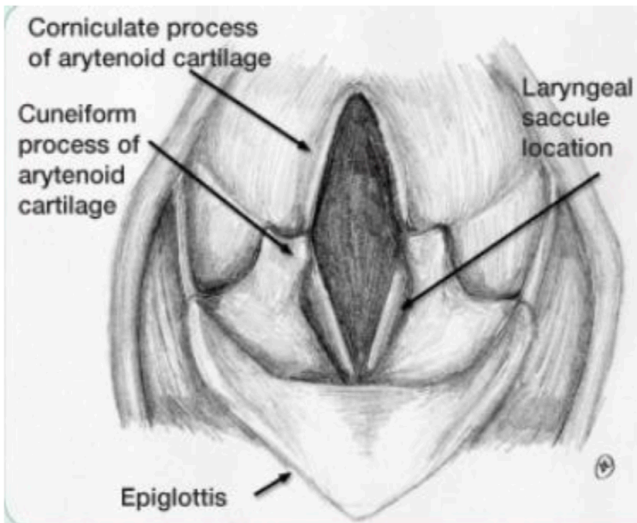


Figure 4. Pertinent anatomy for evaluation of laryngeal function. Illustration by Dena Lodato, DVM.

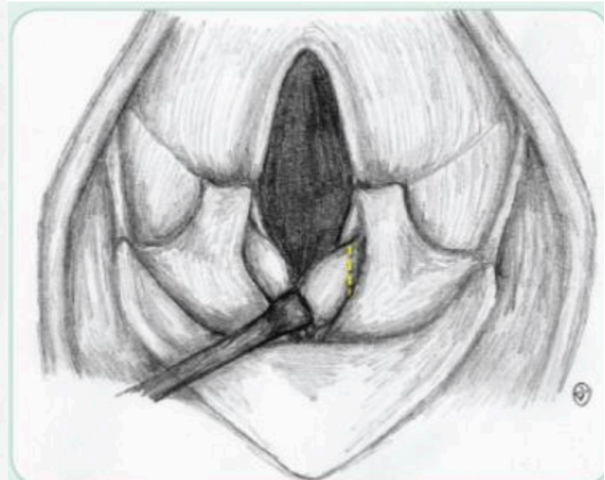


Figure 9. Laryngeal saccule transection; the dotted line represents where transection should take place. Illustration by Dena Lodato, DVM.

AFTERCARE & OUTCOME

Pets must be monitored very closely immediately after surgery. Significant inflammation or bleeding can obstruct the airway, making breathing difficult or impossible. Occasionally a tube must be placed & maintained through an incision in the neck into the trachea (temporary tracheostomy) until the swelling in the throat subsides enough that the pet can breathe normally.

Pets are usually observed in the hospital for at least 24 hours. Post-operative coughing & gagging are common. In chronic cases in which the laryngeal cartilages have become inflexible, removal of the elongated soft palate & laryngeal saccules may not provide enough relief. The creation of a new permanent opening into the trachea in the neck area (called a permanent tracheostomy) may be the only solution, although there are complications associated with this procedure as well.

The **prognosis is good for young animals**. They generally will breathe much easier & with significantly reduced respiratory distress. Their activity level can markedly improve. Older animals may have a less favorable prognosis, especially if the process of laryngeal collapse has already started. If the laryngeal collapse is advanced, the prognosis is poor.

RECOVERY (Post – Surgery)

- Delay extubation until the patient is conscious & has regained the ability to swallow, which ensures that the animal is able to adequately breathe. This may take longer than typically seen with routine postoperative recoveries.
- Provide supplemental oxygen as needed.
- Monitor the patient's respiratory rate & effort for a minimum of 6-8 hours post-operatively.
- If respiratory distress is encountered, address it immediately by administering supplemental oxygen & sedation. If the patient fails to respond, a temporary tracheostomy may need to be performed.
- Withhold water for 12 hours; then offer it in small amounts. If the patient tolerates water, offer food & monitor the animal closely for signs of impaired swallowing. Coughing & gagging may occur but generally resolve over several weeks.
- An E-collar may be beneficial to prevent self-trauma to the nares.

****Be Aware of this Surgery****

1. Will not eliminate SNORING.
2. Brachycephalic airway associated syndrome pre-caution should still be practice.
 - Do not allow for pet to overheat (avoid walks during warm temperature)
 - Do not allow for pet to become anxious
 - Do not allow for pet to excessive pant
 - Do not allow for pet to over exercise or exert too much energy

PAIN MANAGEMENT

- Acepromazine (sedation) or Trazodone (anxiety/sedation): is beneficial for animals that are anxious or excited after surgery for at home medication usage.
- Gabapentin or Tramadol (pain relief): provides adequate analgesia (pain relief) for these procedures & mild sedative effects. In addition, it does not create the panting, nausea or vomiting seen with use of some opioids, which eliminates the risk for potential aspiration of vomitus. Its analgesic effects are short lived, so frequent dosing (every 8-12 hour) may be necessary.
- Meloxicam or Carprofen (NSAID): provides adequate anti-inflammation for these procedures & also to indirectly reduce pain & swelling. May cause gastrointestinal upset ie diarrhea, vomiting or reduce appetite.
- Cerenia (anti-vomiting, anti-nausea) is also recommended because, in general, nausea & regurgitation are common in brachycephalic breeds after surgery.
- Famotidine (antacid) or Omeprazole (antacid): provides reduction in stomach acid in the chance that the patient vomits this will help reduce episodes of esophagitis/aspiration pneumonia/vomiting & nausea. Recommended be given with cerenia.

COMPLICATIONS

Most common complications include the following:

- Aspiration Pneumonia
- Coughing &/or Gagging
- Dehiscence (incision/wound opening)
- Hemorrhage
- Infection &/or Inflammation (swelling)
- Nasal Discharge
- Non-Cardiogenic Pulmonary (lung) Edema
- Regurgitation &/or Vomiting
- Sloughing of the pigmented layer of the skin after laser rhinoplasty (only if applicable)
- Voice change

If you have any questions, please feel free to ask your veterinarian &/or veterinary surgeon.

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