

Laryngeal paralysis in small animals

What is Laryngeal paralysis?

Laryngeal paralysis may be unilateral or bilateral and it is the complete or partial failure of the **arytenoid cartilages and vocal folds** to open during the inspiratory phase of breathing. It is caused by a dysfunction of the recurrent laryngeal nerve(s): these paired nerves innervate the only muscles that actively open the upper airway during breathing. If these nerves do not function properly, the cartilages will not open, and air flow is obstructed. This will be more noticeable during warm weather, or during exercise, as the breathing rate will speed up. Additionally, these cartilages normally close off the airway during swallowing, and inability to do so might predispose an animal to aspiration of food and secretions into the lungs, resulting in aspiration pneumonia.

Laryngeal Paralysis can occur in both dogs and cats but is much more common in dogs. It can be **congenital or acquired**. Congenital (meaning that they were born with it), inherited laryngeal paralysis is rare, but is reported in certain breeds. Acquired laryngeal paralysis (paralysis that develops later in life) is most common and often due to unknown cause ('idiopathic') and generally develops over time in older/geriatric dogs. Less commonly there might be a cause, such as include trauma to the nerves/neck, cancer of the neck, or secondary to diseases (such as hypothyroidism, immune mediated diseases or as a component of a widespread nerve or muscle disease), or as a result of damage during surgery.

Symptoms:

Laryngeal paralysis is typically a chronic, slowly progressive condition. Affected animals may have a progressive increase in harsh, noisy breathing (snorting, gurgling) especially during inspiration. Some owners will also note that their pets' bark has changed in character or that they have become relatively exercise intolerant (tiring easily). Acute worsening of clinical signs and severe respiratory distress can, however, occur and is more likely following strenuous activity or during hot, humid weather. Obesity may also worsen clinical signs. Because of laryngeal dysfunction, affected animals may also experience gagging, coughing while eating or drinking, vomiting or regurgitation. Animals with laryngeal paralysis secondary to another disease process may have additional clinical signs caused by the underlying disease. Animals with an underlying neurologic condition such as a generalized polyneuropathy or myasthenia gravis may exhibit other neurologic deficits such as hind limb weakness.

Pre-surgical work up & diagnosis:

- General physical & complete neurological examination
- Routine laboratory testing (CBC, chemistry profile, urinalysis, thyroid hormone testing)
- Chest x-rays
- Potentially cervical radiographs, CT scan (if other disease is suspected)
- Potentially advanced neurologic testing (if underlying neurologic disease is suspected): EMG, nerve conduction velocity, Ach receptor antibody testing

- Functional laryngeal examination: this is done via a sedated oral exam, and preferably done immediately prior to surgery, to avoid having to recover the patient without having addressed the airway issues.

Functional laryngeal exam:

The final diagnosis of laryngeal paralysis is made based on **direct evaluation of laryngeal function**. This is accomplished with the animal under a light anesthesia, prior to the insertion of an endotracheal tube. Specific anesthetics are chosen such that they do not interfere with laryngeal function. In affected animals, the laryngeal cartilages (and vocal folds) are located along the midline of the airway and do not move laterally (open) during inspiration. In animals experiencing acute respiratory distress, the laryngeal tissues may appear swollen and reddened. In animals with complete paralysis (or laryngeal collapse), the cartilages on the affected side may be sucked into the airway as the animal breathes in, making the airway lumen even smaller.

To avoid repeated anesthetic episodes most clinicians prefer to move directly to surgery once laryngeal paralysis has been diagnosed via laryngeal examination. This helps to reduce the risk of aspiration pneumonia in a patient that is already predisposed and limits the trauma and associated swelling of the upper airway associated with repeated endotracheal intubation.

Treatment:

Medical: Animals suffering from unilateral laryngeal paralysis may not require surgical treatment if they are able to avoid excessive weight gain, strenuous activity and hot weather. Owners of overweight animals with mild clinical signs are instructed to begin a weight loss program and restrict activity, especially during summer months.

Emergency stabilization: For animals presenting with acute respiratory distress, initial medical management in the form of sedation, corticosteroid administration, cooling and oxygen therapy is necessary for stabilization prior to further diagnostic evaluation. In the most severely affected animals or in cases where laryngeal swelling does not respond to medical management, it is sometimes necessary to perform a temporary tracheostomy or to place an endotracheal breathing tube until surgery can be performed.

Surgical: Surgery is recommended for patients experiencing moderate to severe respiratory distress. The goal of surgical treatment is to enlarge the laryngeal opening. While various surgical techniques have been described for the treatment of laryngeal paralysis, the current surgical treatment of choice is a procedure known as a unilateral arytenoid lateralization (UAL), or a “laryngeal tie-back”. This procedure is most commonly performed through an incision on the left side of the neck. Through this approach, sutures are placed between the cartilages of the larynx in order to slightly open the airway, and keep it in this open position permanently. Care is taken to avoid over-tightening the sutures to reduce the risk of postoperative aspiration.

In cases of acquired laryngeal paralysis the underlying diseases such as hypothyroidism should be treated as indicated.

Complications:



Specific complications related to laryngeal paralysis include:

- Anesthetic risks: As with any surgical procedure, there are always risks associated with the use of general anesthesia. These risks are generally low in young or otherwise healthy animals, but are considered to be increased when animals are older or suffering from systemic disease.
- Suture failure
- Cartilage laceration/fracture (more likely in older animals)
- Inappropriate suture placement, over-tightening of sutures (making the opening ‘too wide’)
- Bleeding
- Postoperative swelling
- Aspiration pneumonia: either during the perioperative phase, or during the pet’s lifespan (see under aftercare).

Your surgery team will discuss these complications in more detail during your pet’s visit.

Post operative care:

In hospital:

Following surgery, animals generally spend 1-2 days in the hospital when complications are not encountered. Patients are monitored for signs of respiratory distress associated with swelling of the airway. Intravenous fluids and pain medications are continued, however every effort is made to avoid a deep plane of sedation, as this may increase the risk of aspiration pneumonia. Cold compresses are applied to the incision to prevent swelling.

Feeding will initially be with canned food divided up in hand sized portions and will be supervised to make sure that the patient can safely eat.

At home care:

First weeks postoperatively: After discharge from the hospital, you will be instructed to restrict your pet’s activity and to make an effort to prevent excessive barking for 6 to 8 weeks. Sutures or staples should be removed in 10-14 days. Occasional coughing may occur following surgery however if coughing continues or is severe, medications may be administered to reduce the risk of suture failure. Feeding of canned food during the recovery is recommended, after which kibble can be reintroduced.

Use of a harness, rather than a collar is recommended – not only during recovery from surgery but for the remainder of your pet’s life to avoid any stress or trauma to the surgery site.

Monitoring: Close monitoring of breathing patterns during the pet’s life is recommended, as they are at a higher risk for aspiration pneumonia.

Life style:

Pets that have undergone laryngeal tie-back are not allowed to swim anymore, as they cannot close their airway (fixed in permanent open position) and they might aspirate water during swimming. Similarly, care must be taken during a bath, or underwater treadmill therapy.

Prognosis:

Animals with mild to no clinical signs at rest may do well without surgery, however as most cases of laryngeal paralysis are idiopathic, progression of clinical signs is anticipated. The prognosis for those animals undergoing a tie-back surgery is generally good with an immediate improvement of breathing, however complications can occur after surgery.