

LARYNGEAL PARALYSIS

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The larynx (voice box) is the gate keeper at the top of the airway. It allows air into the trachea (windpipe) and down into the lungs but stops food and liquids from going down into the airways. It is made up of five cartilages which together form a box-like structure. The flow of air through the larynx is determined by the size of the opening in the middle of the larynx. When breathing in (inspiration) the laryngeal opening is dilated to allow air to move freely into the lungs, when breathing out (expiration) the laryngeal opening partially closes. During swallowing the laryngeal opening is fully closed and is covered by the epiglottis to prevent aspiration of food (breathing food down into the lungs).

WHAT IS LARYNGEAL PARALYSIS?

Any disease process which interferes with the nerve supply or function of the muscles to the larynx will prevent effective dilation of the opening of the larynx. While in > 80% of acquired laryngeal paralysis we don't know what causes the dysfunction (idiopathic), reported causes include neck trauma (from dog fights or choke chains), masses in the neck or chest (thyroid cancer or other tumors) or trauma caused by surgery.

Idiopathic? - That means we don't know what causes it!

By far the most important cause of laryngeal paralysis is the idiopathic degeneration of the recurrent laryngeal nerve. Typically, the disease begins as a one sided process but may progress over time to affect both sides. Several breeds have been recorded as being particularly at risk including: Labrador and Golden Retrievers, Newfoundlands, Leonbergers, Pyrenean Shepherds, but also other breeds and mixed breeds. In the United States Siberian Huskies are reported to be at greater than average risk. The disease is encountered in old age (10-12 years, average). Frequently its clinical signs are overlooked as being part of "getting old" because of its insidious onset. A congenital form, affecting younger dogs, is seen in Bouvier des Flandres, and Dalmatians.

Congenital

The congenital form of laryngeal paralysis is much less commonly encountered than the idiopathic form but it has been demonstrated to be associated with a genetic inheritance in the Bouvier des Flandres. Congenital cases in other breeds are rare; however there are reports of Juvenile laryngeal paralysis in Siberian Huskies, Dalmatians, Pyrenean Mountain Dogs, and Bull Terriers.

Dogs with the congenital form of laryngeal paralysis are affected with the disease at a much earlier age (usually before 1 year of age) than in dogs with the idiopathic form. As well as laryngeal paralysis some dogs will develop other neurological signs. Congenital laryngeal paralysis can occur in cats.

WHAT ARE THE CLINICAL SIGNS?

- Decreased exercise tolerance
- Noisy, raspy sound to breathing on inspiration
- Change in bark
- Coughing
- Gagging
- Blue color to the tongue and gums
- Collapse

Laryngeal paralysis leads to failure of one or both sides of the larynx to open during inspiration. Associated with this impaired airway function is a reduction in exercise tolerance which may be so severe as to result in a blue color to then tongue and gums and collapse (Cyanosis). A common although not consistent sign is a change in bark which can develop early in the course of the disease. Dogs with laryngeal paralysis may develop a high pitched bark or simply loose their

bark altogether. A small number of dogs will gag or show signs of trouble breathing or coughing when eating, presumably caused by inhalation of food through the larynx and into the lower airway.

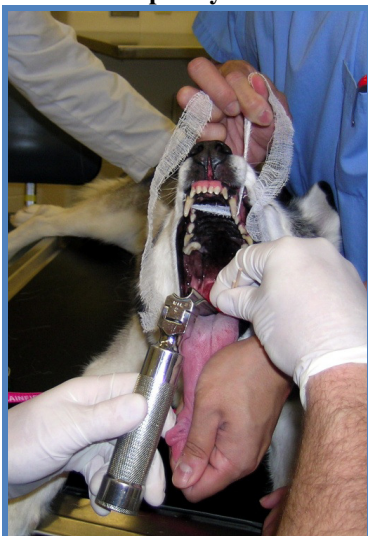
Often dogs present to veterinarians during the warm months of the year, particularly the first warm and humid days after winter. Owners commonly report that their dog has been having a slowly progressive history of increased respiratory noise and effort that may have started with a change in bark and mild inspiratory noise 1-3 years earlier. The patients will have varying degrees of inspiratory noise and difficulty breathing.

Although the condition is usually slowly progressive, some dogs can acutely decompensate and present on an emergency basis. In these cases it's crucial to calm the patient and provide them with an ample supply of oxygen. This is usually done by given them mild sedation and providing supplement oxygen. If the patient's temperature is really high from overheating, emergency measures are taken to lower it. Once the patient is stable, surgery is the best treatment.



HOW IS IT DIAGNOSED?

Many experience Veterinarians will be highly suspicious of laryngeal paralysis the minute they hear the dog breathing but inspection of the larynx in a lightly-anesthetized dog is the only means of reaching a firm diagnosis. In the normal dog the larynx opens during inspiration and closes on expiration. **Failure of the larynx to open during the inspiratory phase is indicative of paralysis.**



Airway exam under light sedation

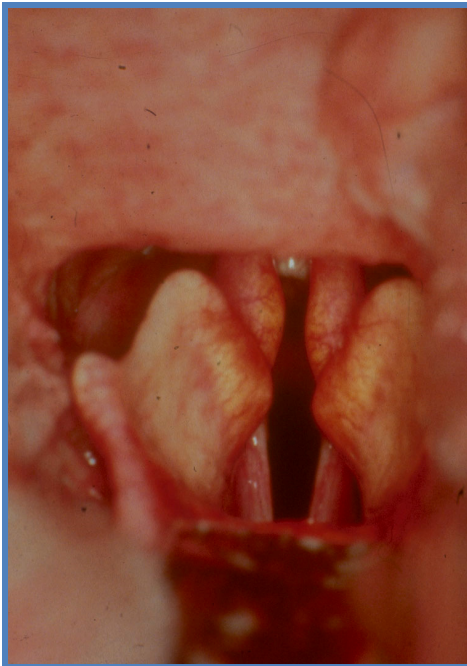
Radiographs

Chest X-rays should be performed to rule out other causes of difficulty breathing and to detect underlying causes.

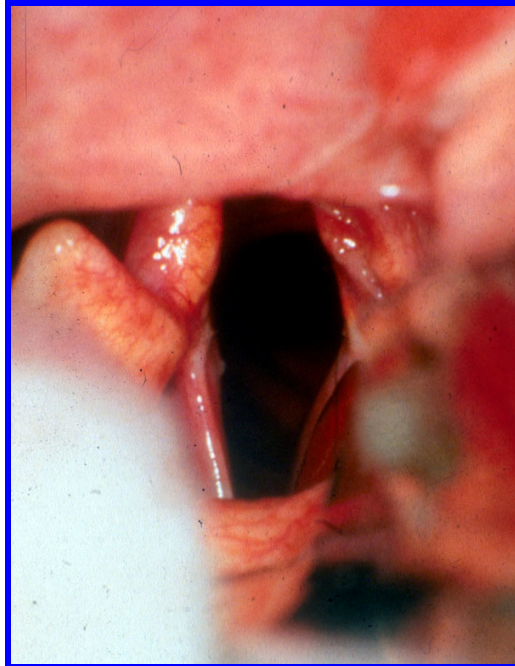
WHAT IS THE TREATMENT OF LARYNGEAL PARALYSIS?

A variety of techniques have been described for the relief of laryngeal paralysis and all are aimed at increasing the diameter of the laryngeal opening. The most commonly performed technique is **Arytenoid lateralization** (**Laryngeal tie-back**): This involves surgically anchoring one of the cartilages at the side of the larynx (arytenoid cartilage) in an open position so that the laryngeal opening is permanently dilated. One sided (unilateral) lateralization normally results in satisfactory respiratory function and bilateral procedures are not only more complex in their surgical approach but also carry a far higher risk of aspiration pneumonia (breathing food and liquids down into the lungs leading to inflammation and infection).

It is important to remember that this surgery is NOT restoring normal function to the larynx.



Laryngeal opening before surgery



Laryngeal opening after surgery

Complications

Lateralization is associated with a low incidence of postoperative complications. In one long term study of the results of lateralization >90% of dogs alive one year postoperatively were found to have no exercise intolerance due to respiratory dysfunction and no discernible inspiratory noise.

Possible complications of lateralization include fragmentation of the cartilage being used to anchor the larynx in an open position, failure to adequately dilate the laryngeal opening, disruption of the lateralizing suture during the post-operative period and swelling

WHAT ABOUT ASPIRATION PNEUMONIA?

The biggest and most concerning postoperative complication seen is aspiration pneumonia. The clinical signs of aspiration pneumonia include lethargy, fever and a deep, productive cough. Diagnosis of aspiration pneumonia is confirmed by chest x-rays. Many dogs with aspiration pneumonia can be managed with oral antibiotics on an

outpatient basis. If the patient is very sick and will not eat, then they should be admitted for fluid therapy and intravenous antibiotics. Severe aspiration pneumonia can be fatal in a small number of cases.

Aspiration pneumonia can occur any time from early in the postoperative period too years after surgery.

IS IT JUST THE LARYNX THAT IS AFFECTED?

Laryngeal paralysis can be an early sign of a more general neurological degeneration. Some dogs suffering from laryngeal paralysis experience esophageal problems and over time, they exhibit generalized neurological deterioration, initially noticeable in their hind limbs. Those dogs that develop esophageal dysfunction are at a greater risk of developing aspiration pneumonia.

WHAT IS THE POST OPERATIVE PERIOD LIKE?

Usually dogs wake up from anesthesia breathing much better than they did preoperatively and it does not seem to be a painful surgery. They are discharged from the hospital on pain medications and antibiotics and should be kept calm and avoid strenuous activity for the first two weeks after surgery.

Most dogs can eat and drink fairly normally after tie back surgery. It may be beneficial to initially divide their daily food intake into smaller meals. Some dogs will cough and gag more after surgery. Avoid very dusty food and some people suggest elevating the food bowl.

Dogs' voices will be permanently altered after surgery and the bark will lose its resonance.

Dogs should not be allowed to swim after surgery since this puts them at an increased risk for aspiration.

We recommend using a harness instead of a collar and choke chains should not be used.

Many older dogs can enjoy a significant increase in longevity (often years) with good qualities of life. In dogs in which laryngeal paralysis is part of a more systemic neuromuscular disorder, the prognosis may be more limited because of progressive esophageal or limb dysfunction.