Laryngeal Paralysis in Dogs

Don R. Waldron, DCM, DACVS
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Laryngeal paralysis is a congenital or acquired disease that causes upper airway obstruction. Paralysis causes partial or complete obstruction of the laryngeal lumen due to denervation of the cricoarytenoideus dorsalis muscle of the larynx. Interruption of nerve transmission from the recurrent laryngeal nerve or the vagus results in failure of the arytenoid cartilages and vocal folds to abduct on inspiration. Congenital laryngeal paralysis has been reported in Bouvier de Flanders, Bull Terriers, Siberian Huskies, Dalmatians, and Rottweiler's. When seen in a young patient generalized neuromuscular disease should be suspected. Further, if you should be suspicious of this disease in a young dog I would consult with a neurologist as some of the diseases causing laryngeal paralysis if the young/congenital cases are progressively fatal.

This disease is seen MOST commonly in dogs in referral surgery settings as the acquired, idiopathic form. The acquired form of the disease occurs in geriatric 10-12 years of age) sporting and giant breeds such as Labradors, Golden Retrievers, St. Bernards, and Afghan hounds. There is a sex predilection with male canines being affected more commonly. Although termed idiopathic, many of these animals likely do have some form of neuromuscular disease; Hypothyroidism has been identified concurrently with laryngeal paralysis. Hypothyroidism can cause a peripheral neuropathy with resulting weakness which responds to replacement therapy; laryngeal paralysis however does NOT respond to thyroid replacement therapy. The disease is also seen occasionally in smaller breeds and has been reported in a series of cats. Surgical procedures performed in the neck can also cause laryngeal paralysis (iatrogenic) if the vagus/recurrent laryngeal nerves are injured bilaterally. Thyroidectomy in cats has been a cause of laryngeal paralysis if care is not taken to preserve the recurrent laryngeal nerves during surgery.

Clinical signs

The most common signs are related to airway obstruction and include exercise intolerance, limb weakness, inspiratory dyspnea, loss or change in bark, and respiratory stridor. Owners often report "noisy" breathing. Dogs with this disease may be presented for heat related stress during the spring or summer months when they acutely decompensate due to impaired laryngeal function. In cases of suspected laryngeal paralysis the cervical area should be carefully examined and palpated for the presence of masses or foreign bodies. Physical examination if often unrewarding and definitive diagnosis is made by laryngoscopic or endoscopic examination of the larynx and glottis. Thoracic and cervical radiographs should be taken to assess the thorax for mediastinal masses and/or the presence of aspiration pneumonia and the cervical area for presence of extraluminal masses and megaesophagus. The presence of megaesophagus is an ominous sign and is regarded as a contraindication to surgery by some clinicians. We have identified "swallowing" abnormalities in some dogs. Dysphagia of any type should be pursued diagnostically prior to any surgery for the laryngeal parlysis Neoplasia of the pharyngeal or laryngeal areas may also cause signs similar to laryngeal paralysis. Hypothyroidism has been identified rather commonly in dogs with laryngeal paralysis and should be tested for.

The definitive confirmation of a diagnosis of laryngeal paralysis is made by observing laryngeal function while the animal is under very light anesthesia. It is essential that the animal retain the cough and gag reflex for laryngeal exam; if too much barbiturate or other sedation is administered thereby abolishing the gag reflex an incorrect diagnosis of laryngeal paralysis may be made. It is recommended that small doses of short acting barbiturates or propofol be administered to an animal without premedication. Low doses of mixed ketamine and diazepam may also be used to aid in diagnosis of the disease. In dogs with laryngeal paralysis, the arytenoid cartilages and vocal folds do not abduct on inspiration and the vocal folds are located in a paramedian position. The examiner should strive to correlate any movement of the vocal folds with the phase of the respiratory cycle. In dogs with paralysis, the vocal folds will often be moved slightly laterally by the passive expiration of air from the lungs; this slight "flutter" movement should not be confused with abduction on the inspiratory phase. Laryngeal paralysis in dogs is bilateral in most cases. If there is doubt about movement of the arytenoids or vocal folds dopram (1.0 mg/kg) may be administered to stimulate respiration.

Data base

We routinely obtain thoracic and cervical radiographs to look for aspiration pneumonia, mediastinal, and cervical masses or megaesophagus, Barium swallows are performed under fluoroscopy if the animal is dysphagic. Thyroid levels are routinely screened.

Recently, investigators at the University of Minnesota published a paper describing abnormal esophageal function in a group of 30+ dogs with laryngeal paralysis. They detected the disease on esophageal swallows performed under fluoroscopy. In reexamination of all dogs a year later they found that the dogs had progressive signs of peripheral neuropathy; i.e.-Rear limb weakness. The investigators recommended routine esophageal contrast study in each dog with suspected laryngeal paralysis. We advise owners preoperatively that the laryngeal paralysis is the "tip of the iceberg" and that the patient has neuromuscular disease that will likely progress over time; we do not perform esophagrams routinely.

Ultrasonography of the larynx to diagnose laryngeal paralysis has been described. I do not have experience with this modality as a diagnostic tool.

Treatment

Initial management of animals with laryngeal paralysis should include symptomatic therapy to enable normal ventilation. Some animals with laryngeal paralysis are not dyspneic and may be managed conservatively by minimizing exposure to high temperature and the stress of exercise, use of a harness rather than a neck leash, and avoidance of obesity. Success with conservative management correlates directly with the owner's expectations; i.e.- Conservatively managed dogs will NOT be exercise tolerant, capable of leash walks, hikes, etc. Hyperthermia is treated by cooling the patient with wet towels or alcohol applied to the trunk and/or extremities. If the animal is dyspneic at presentation, oxygen is administered by face mask, nasal oxygen catheter, or in an oxygen cage. Corticosteroids and tranquilizers may also assist in preoperative stabilization of the patient. Rarely, temporary tracheostomy may be necessary to stabilize the animal prior to clinical work-up and definitive surgery. Avoid tracheostomy if possible because of the intense care necessary to care for the tracheostomy post procedure

Although not ideal, some dogs can be managed conservatively by owners if they keep the dog quiet and cool. These are dogs that are not overtly dyspneic on presentation. Dogs that are dyspneic need surgical intervention or possibly euthanasia for relief of signs.

Surgical treatment

Surgery is the treatment of choice for dogs with laryngeal paralysis. An exception to this is dogs that have megaesophagus. It is thought that performing "tie-back" surgery on animals with megaesophagus will contribute to and hasten death from aspiration. Might another technique be favorable in these dogs??? Permanent tracheostomy is recommended by some surgeons if the re is megaesophagus. Laryngoplasty techniques include partial arytenoidectomy and vocal fold excision, castellated laryngofissure, and arytenoid lateralization or "tie-back" procedures. Most surgeons prefer to perform an arytenoid lateralization ("Tieback") technique. The goal of any surgical procedure is to widen the glottis enough to prevent dyspnea in normal semi-restricted activity. Most animals have acceptable exercise tolerance following surgery however athletic performance should not be expected. Most surgeons also agree that partial arytenoidectomy and vocal fold excision performed per os is NOT an acceptable surgical procedure. This procedure can cause "webbing" and excessive granulation tissue formation necessitating permanent tracheostomy for salvage. Castellated laryngofissure is more complicated surgical procedure that is successful in treatment of this disease. Because of the more complex nature and the fact that tracheostomy is necessary during surgery this technique is rarely performed.

Unilateral arytenoid lateralization is performed by retracting the arytenoid cartilage laterally and attaching it to the cricoid or thyroid cartilage cartilage. I prefer to suture the muscular process to the cricoid. Specifically, the muscular process of the arytenoids is sutured to the caudodorsal border of the cricoid cartilage with non-absorbable or long-lasting absorbable suture. Tieback procedures are performed unilaterally to decrease the incidence of aspiration pneumonia following surgery. A recent study of a large number of tieback cases revealed that about 15-20% of animals develop aspiration pneumonia following surgery. This may occur in the perioperative period or up to a year later. Overall success with the surgical procedure is reported to be 80-100%. Aspiration pneumonia can potentially be a serious consequence of the disease or following surgery. This risk seems to be present life-long with the disease.

Consider if you anesthetize these dogs administering metoclopramide prophylactically; the theory is by increasing gastroesophageal pressure at the lower esophageal sphincter you may decrease gastroesophageal reflux (GER) and possible regurgitation during the anesthesia thus decreasing the risk of "silent" aspiration".

Bolus loading dose 1 mg/kg IV, followed by infusion at a rate of 1.0 mg/kg/hr. In an experimental study, this decreased GER risk by 54%. It is unknown whether this will translate to a decrease in aspiration risk in dogs with laryngeal paralysis.

Arytenoid lateralization procedure

1. Place the animal in right lateral recumbency if the surgeon is right-handed. A towel is placed ventral to the neck to cause elevation of the cervical area.
2. A 10-12 cm skin incision is made from the angle of the mandible to the jugular furrow.
3. Subcutaneous tissue and superficial muscle is incised and the jugular vein retracted dorsally. Electrocautery is used to coagulate small bleeders.
4. The wing of the thyroid cartilage is palpated and a "stay suture'" placed to allow lateral traction.
5. The thyropharyngeus muscle is incised to expose pharyngeal membrane which is also incised.
6. The cricoarytenoid articulation is palpated and separated.
7. The cricoid cartilage on the posterior larynx is palpated and a suture of 2-0 or 0 polypropylene placed around the cricoid and then through the disarticulated muscular process.
8. The suture is tied snugly but NOT over tightened. Remember, the animal already has an endotracheal tube in place thus the glottis is relatively open.
9. If desired, the tube may be removed and the glottis checked for appropriate opening.

10. The thryopharyngeus muscle and other soft tissues are closed routinely.

Postoperatively, we typically start the dog on ice-chips and then small meat balls of food to see how the animal tolerates alimentation.

If you have a patient with laryngeal paralysis and megaesophagus I believe most surgeons would recommend either NO surgery OR a Permanent Tracheostomy for management.

Key summary points for laryngeal paralysis

- Disease is seen most commonly in middle-aged medium to large breed dogs
- Exercise intolerance, noisy inspiratory breathing, change in bark are common signs
- Take thoracic radiographs to assess for aspiration pneumonia or megaesophagus
- Rule out physical obstruction by neoplasia with laryngeal examination
- Arytenoid tie-back produces very good clinical results in most dogs although the patient is always at risk for aspiration. If they do not aspirate repeatedly dogs have a good quality of life
- Many dogs will continue to slowly deteriorate peripherally as a result of generalized neuromuscular disease disease