The nature of equine sports requires horses to move massive volumes of air during work in order to oxygenate and function at their physiologic maximum. Performing maximally, an adult horse weighing approximately 1000 pounds must move about 12-15L of air with each breath; up to 1400-1800L per minute (Hinchcliff, 2008). In order to move such a large volume of air, the horse’s airway must be structurally correct as well as properly functioning. Any deviations from normal anatomy or function could result in decreased air movement and poor performance.

The structure of the horse’s throat is such that the soft palate sits up against the larynx, making the horse an obligate nasal breather. The larynx serves as a conduit for airflow from the nasal passages into the trachea, as well protecting the airway by closing during swallowing (Slovis, 2004). The narrowest part of the entire airway is the opening of the larynx into the trachea, the Rima Glottidis (#1), and is bordered by the vocal folds and the Corniculate Processes of the Arytenoid Cartilages (#2 is the Left Arytenoid). Just like an hourglass, air can only flow as fast as the narrowest point in the airway allows, and any narrowing of the opening will result in exponentially less airflow. Even if the airway is only partially obstructed, performance can be limited. (The Epiglottis is #3)

When evaluating a horse’s throat, a veterinarian must account for several factors. These factors can include breed, age, intended use, history of performance or lack of, and history of illness. If the throat is abnormal, in addition to these factors, the veterinarian must consider if the abnormality is performance limiting, if it can be corrected or improved, and the likelihood that the abnormality will affect future performance. There are many airway abnormalities and variations of normal that commonly occur in the horse, some of which can be performance limiting, while others not.

Modern technology allows veterinarians to evaluate the structure and function of the airway in multiple ways. Probably the most common modality is stall side Laryngoscopy at rest. Since some problems only occur at maximal exercise, Dynamic Video Endoscopy on a treadmill or over ground can be used (equipment pictured on right). The purpose of the veterinarian’s evaluation will most likely dictate the method used. For pre-purchase examinations, stall side resting laryngoscopy is usually sufficient. For an evaluation of decreased performance or respiratory noise, resting laryngoscopy will more likely be combined with either scoping immediately after work or even video recording during work, among others.

I imagine many people have seen a veterinarian scope a horse at some point, and may have heard descriptions like a “strong throat”, “lazy throat”, or “they are displaced”. In case these comments have left you with questions at times, the following section will provide you with a base knowledge of common abnormalities, what the veterinarian is seeing in the scope, as well as review the effects and potential treatments of the abnormalities.

**“ROARERS”: Left Laryngeal Hemiplagia (LLH) or Recurrent Laryngeal Neuropathy**

LLH is one of the most common abnormalities observed in the equine throat, and is a common cause of respiratory noise at work and decreased performance. It is most common in large breed horses like draught horses and thoroughbreds, but can occur in any breed. In summary, the cause of LLH is the loss of innervation to a muscle on the left side of the throat whose responsibility is to pull the left arytenoid open. It is unknown why this occurs, but there are many theories. In most cases there is a progressive loss of function, as seen in the images. It may start as a “lazy throat” where the left side is slower than the right, and can progress to complete paralysis. The images below depict worsening degrees of LLH from left to right. This is the origin of one of the syndromes names; Hemi (one side) plagia (paralysis). Horses with laryngeal hemiplegia are also called “Roarers”, as they have a loud roaring noise when working due to the left arytenoid drooping into the airway and is “flapping in the wind.”
There are many grading scales used by veterinarians, such as an alphabetic, alphanumeric (1, 2A, 2b), and numeric. Regardless of the scale the veterinarian uses, it is important that you understand how the veterinarian is describing the throat.

There are many treatments for “roarers”, most of which are surgical. Alternative treatments are also available, such as acupuncture. Surgery should be reserved for horses that the noise is highly undesirable, or if the horse is expected to be at speed. Horses are significantly affected by airway obstruction when raced at speed for over 1/2 mile (Auer & Stick, 2012). Otherwise, most horses can withstand a low level of airway obstruction. One of the most common surgical treatments is the Prosthetic Laryngoplasty, commonly referred to as a Tie-Back. In this procedure, a heavy non-absorbable suture is used to pull the affected arytenoid cartilage back into a degree of permanent opening, increasing the airway diameter. Other procedures include the ventriculectomy, ventriculocordectomy, arytenoidectomy, and nerve grafts. No treatment is 100% effective, and should only take place when no other options exist. However, in severe cases a lack of treatment can lead to other problems, such as Arytenoid Chondropathy, which may result in infection and abscess formation.

**EPIGLOTTIC ENTRAPMENT**

With epiglottic entrapment, the loose skin that is on the bottom of the epiglottis gets flipped up and sits over the epiglottis like a slipper. This is often an incidental find in young horses, and may be a cause of respiratory noise at work. However, it is rarely a cause of decreased performance. As it can potentially affect the sale price of an animal, it is often surgically corrected. There are multiple methods used to correct the entrapment, with the most common being splitting the tissue with a laser or sharp hook. The initial treatment is usually corrective; however, it is not uncommon for repeat treatments to be necessary. The procedure is not without complications, and post-operative care is important for this and all throat surgeries.

**DORSAL DISPLACEMENT OF THE SOFT PALATE (DDSP)**

As previously mentioned, the soft palate sits below the epiglottis against the larynx, forming a seal. Due to anatomic variances that may cause soft palate laxity or medical issues, the soft palate can be displaced upward, over the epiglottis. In addition to causing a respiratory noise, it is an obstruction during exhalation and can cause decreased performance at speed. Intermittent displacement can be due to many causes, one of which is the shape of the epiglottis. When horses are scoped, the veterinarian most often comments on the size, shape, and tone of the epiglottis. A horse with a large, long, firm epiglottis is less likely to displace than one with a small, short, flaccid epiglottis (Auer & Stick, 2012).

Again, there are multiple treatments that can be used alone or in combination. DDSP caused by medical problems are sometimes amenable to medical treatment. DDSP due to structural abnormalities or non-responsive to medical treatment can be corrected with surgical treatments, such as a Laryngeal Tie-Forward, Myectomy, and shortening of the soft palate.
SUB-EPIGLOTTIC CYSTS

These cysts are fluid filled masses that sit beneath the epiglottis, and are most common in young thoroughbreds and standardbreds (Auer & Stick, 2012). They can cause difficulty eating, drinking, and result in coughing or even pneumonia if foreign material is inhaled (Auer & Stick, 2012). One current surgical treatment involves using a laser to cut the cystic tissue away. The surgeons at Hagyard Equine have developed a novel method for cyst removal, which will soon be described in scientific literature.

There are numerous other changes and structures in the throat that are outside the scope of this newsletter. However, if you hear a respiratory noise when working your horse, your horse has an unexplained decrease in performance, or the horse is being evaluated for purchase, now you may have a better understanding of what the veterinarian is describing.

Thank you to Dr. Nathan Slovis for the use of his pictures in this newsletter.