Proceedings of the
9th International Congress of World
Equine Veterinary Association

Jan. 22 - 26, 2006 - Marrakech, Morocco

Reprinted in IVIS with the permission of the Conference Organizers http://www.ivis.org/
SURGICAL DISEASE OF THE EQUINE RESPIRATORY TRACT AS CAUSES OF POOR PERFORMANCE

Fjeldborg Julie 1* and Keith Baptiste 2

1 Department of Large Animal Science, Large Animal Surgery, 2 Internal Medicine. Royal Veterinary and Agricultural University, Copenhagen, Denmark

Introduction

Disorders of the upper airways in horses are of great importance, since they often lead to disturbances in air uptake, thermoregulation and decreased exercise performance. Understanding the upper airways and disease pathogenesis is crucial to making the correct diagnoses. Often it is possible to make a tentative diagnose based on physical examination at rest and during exercise. However, it can be a challenge to diagnose all cases if the horse demonstrates normal airways at rest and an upper airway abnormality during exercise.

Horses are obligate nasal breathers, unlike other species such as man and dog, which means that they cannot switch to oral breathing in order to reduce respiratory resistance. This happens both at rest and during exercise. Thus, any disturbances in the nasopharynx can have dramatic consequences on exercise performance. Due to the respiratory biomechanics in the horse, the upper airway therefore provides high airflow resistance. During inspiration there is negative pressure that persists and increases during exercise. Inspiration is performed as an active abduction, while expiration is a passive process. When the horse gallops, it inspires each time the front leg is lifted from the ground and expires, when the front leg is returned to the ground, meaning that respiration and locomotion is integrated. During work the upper airways undergo changes in calibre, rigidity and shape mostly by adduction of the nasopharyngeal muscles. To a certain degree this reduces airflow resistance.

At rest the respiratory frequency is between 10 - 18 per min. The tidal volume is 5 - 8 l per respiration, and a minute volume on 75 - 100 l. This gives an oxygen exchange time of less than 2 sec. During work dramatic changes happen: The expiratory frequency increases to 120 - 140 per min. with a tidal volume of 10 - 12 l per respiration, and a minute volume between 1200 - 1500 l. This gives an oxygen exchange time at less than 0.3 sec.

Clinical examination

A thorough clinical examination should be performed to exclude other diseases. The history is important and should include:

- Sudden or progressive start of the symptoms
- Symptoms before/under/after work
- Stenotic sound
- Intermittent or constant problem
- Does the horse have the desired performance capability?!?!
- Daily management

A more detailed examination will include:

- Other signs of diseases (weight loss, coughing, ...)
- Lameness
- Cardiovascular examination
- Respiratory examination
- Neurologic examination
Many disorders of the upper airways can be diagnosed by using a flexible endoscope either at rest or working the horse at a treadmill. Most horses will tolerate an endoscopic examination without sedation - but not all. Sedation with detomidine or acepromazine changes the endoscopic picture of the upper airways and can lead to incorrect diagnosis or missing the diagnosis of an upper airway disease, especially recurrent laryngeal neuropathy. Therefore, it is important to perform a nasal occlusion after sedation when observing the movement of the arytenoids cartilage (1). Also, a 'slap test' can be a useful aid to assess arytenoids function and reflexes.

**Recurrent laryngeal neuropathy (RLN)**

RLN is a distal axonopathy of the recurrent laryngeal nerve, which leads to paresis, or paralysis of typically the left side of the laryngeal muscles. In 98% of cases, it is left-sided. The most important muscle involved is the dorsal cricoarytenoid muscle, the only laryngeal abductor muscle. The aetiology is still unclear, but there is evidence to suggest a certain degree of heritability; although the exact mode of inheritance is unclear. The primary symptom is an inspiratory stenotic sound and reduced performance. A tentative diagnosis can be made from the symptoms but a conclusive diagnosis can only be made by endoscopy either at rest or during treadmill exercise. Due to difficulty to diagnose all cases of RLN, then the condition cannot be definitively ruled out without an endoscopic assessment of the larynx during a full treadmill regimen. A grading system is often used, and recently a new grading system has been revised at the Havermeyer Symposium (2). The most common surgery for RLN is laryngoplasty (tie back) alone or in combination with ventriculectomy (3). The success of this surgery is well documented and has shown to return upper airflow to baseline values. Laryngeal reinnervation (2) is another treatment for RLN. The major advantage of this technique is the absence of permanent alteration of the arytenoids resulting in minimal post-operative complications (4,5). Endoscopic guided laser surgery with unilateral laser cordectomy/ventriculectomy alone or in combination with laryngoplasty has become more popular in recent years. Used alone the advantage is that it is less expensive and general anesthesia is not required. Used in combination with laryngoplasty has the advantage that laryngotomy is not needed.

**Dorsal displacement of the soft palate (DDSP)**

An intermittent or persistent dislocation of the soft palate over the epiglottis characterizes DDSP. This leads to an inspiratory or expiratory snoring sound and dyspnea. Although the aetiology and pathogenesis is still unclear, there is evidence that neuromuscular dysfunction of the palatal musculature plays an important role in some cases of DDSP (6, 7, 8). Specifically, the pharyngeal plexus nerves along the floor of the medial compartment of the guttural pouches have been shown to play a role in DDSP. Thus, in some cases of, simple inflammation of the retropharyngeal lymph nodes and/or guttural pouches could lead to dysfunction of the pharyngeal plexus and DDSP. This also suggests that not all cases of DDSP require surgical correction, but instead rest and NSAIDS. However, DDSP is likely a disease complex syndrome with multiple aetiologies and different treatments. The diagnosis of DDSP can be difficult to confirm both at rest and under hard work, so often the diagnosis is made through a process of exclusion. Treatments for DDSP are as diverse as the hypothesized aetiology. This includes anti-inflammatory therapy, tongue-tie, staphylectomy, strap muscle resection, epiglottic augmentation and laryngeal tie-forward (9). The results of these different treatments vary. Recently, the 'laryngeal tie forward' procedure has been proposed to improve the performance of up to 80% of horses with DDSP.

**Epiglottic entrapment (EAE)**

EAE is characterized by an entrapment of the epiglottis in the glossoepiglotica fold and its continuation, the aryepiglottical fold. The aetiology is often unknown, but primary inflammation of the fold has been suggested as well as a hypoplastic epiglottis. Due to a hypoplastic epiglottis the EAE is mostly seen in conjunction with dorsal displacement of the soft palate. The symptoms of EAE can vary from no symptoms, to an inspiratory and/or expiratory stenotic sound during exercise. Coughing and regurgitation can also follow from the disease. A diagnosis can be made by endoscopy and/or radiology. Therapy can be surgical by cutting the fold through the mouth with at sharp hook or by laser. The prognosis is good when the epiglottis is of normal size.
References


