



Previous VET NOTES

- February 2006 - Common medications used to assist breeding, cycle regulation and pregnancy maintenance of the mare
- January 2006 - Managing high risk pregnancies
- December 2005 - Affording the unhealthy horse
- November 2005 - Strangles
- October 2005 - The "dummy" foal
- September 2005 - New medications
- August 2005 - Extracorporeal shockwave therapy (ESWT)
- July 2005 - Vaccination recommendations
- June 2005 - The advantages of high fat/low carbohydrate diets for horses
- May 2005 - The Hoof: Form and function
- March 2005 - Liquid gold
- February 2005 - Breeding the problem mare
- January 2005 - Condylar fractures
- December 2004 - Early diagnosis and treatment of high-risk pregnancy in the mare
- November 2004 - Know your horse
- October 2004 - White Line Disease
- September 2004 - Announcements

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The use of high speed treadmill to diagnose upper respiratory tract disorders

Poor performance is a common complaint in equine athletes. Lameness is the most common cause of poor performance in horses but suspected respiratory problems can affect a small amount of equine athletes. Most performance problems can be elicited with a complete history, physical exam, lameness exam and diagnostic imaging (radiographs, nuclear scintigraphy, endoscopy). However, some horses have performance limiting problems which are unknown and or very subtle. These horses need specialized performance evaluations to diagnosis their problem. One such performance evaluation is the examination of the upper respiratory tract when the horse is in motion on a high speed treadmill.

The indications for a high speed treadmill examination of the upper airway are exercise intolerance, respiratory noise, and or drainage. Examination of the upper airway in horses at rest can sometimes be misleading.

The function of the upper airway can change dramatically from the resting state. Subtle problems or questionable problems at rest can truly be evaluated at high speed and their affects on performance determined. A common finding on resting endoscopy is a slow or lazy arytenoid (flapper) or a flapper that doesn't abduct completely. These problems can be fully evaluated with a high speed treadmill examination. Moreover, the response to treatment can be evaluated with a treadmill exam. A laryngoplasty (tie back) that has possibly failed can be evaluated with a treadmill exam.



The treadmill exam is treated just like a race for the horse. The horse is

(Continued on page 2)

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introduced to the treadmill and is acclimated to running on the treadmill. Time is taken to train the horse properly in order to achieve the best exam possible but also be safe for the horse and treadmill personnel. Once the horse is trained a video endoscope is inserted in one nostril and stabilized. The horse is then exercised using a standardized step test, which is a timed incremental increase in exercise intensity on an inclined treadmill. The entire exam is recorded and reviewed after the test.

The more common performance limiting findings with a treadmill exam at Peterson Smith are idiopathic left laryngeal hemiplegia (roarer), dorsal displacement of the soft palate, and axial deviation of the aryepiglottic folds.

Laryngeal hemiplegia or roarer can be unilateral or bilateral and is most commonly the result of damage to the recurrent laryngeal nerve. This damage is usually of a slow nature and results in progressive atrophy of the muscles that pull (abduct) the arytenoids out of the airway. The loss of abductor function results in the flapper falling into the airway and causes inspiratory noise and obstruction of the airway. Laryngeal hemiplegia can be found in any age of horse but more frequently in young Thoroughbreds examined for sale or shortly after initiation race training. Arytenoid paralysis leads to an abnormal respiratory sound in most horses characterized as a whistle or roar when exercised.

Dorsal displacement of the soft palate (DDSP) results in an expiratory obstruction and noise. DDSP can be either intermittent or permanent. Permanent DDSP is usually the result of a neurologic component which results in dysphagia. Intermittent DDSP in athletic horses can be very difficult to diagnose and treat. The cause of DDSP is multifactorial and not well understood. A high speed treadmill exam is very helpful in identifying horses affected with intermittent DDSP.

Axial deviation of the aryepiglottic folds (AE folds) is a rare airway abnormality that is mainly found in young horses that are just beginning training. The majority of these horses have signs of exercise intolerance and respiratory noise from the start of their training. High speed treadmill with video endoscopy is needed in order to observe this dynamic collapse of the AE folds.

The diagnosis of these various upper airway disorders would not be possible without high speed treadmill examination. The treadmill exam is certainly helpful but is not always successful. The treadmill is a modality in which how much exercise the horse receives can be controlled but is not exactly similar to racing. Some nervous horses and hard to train horses will not show signs of their upper airway ailment on the treadmill and several examinations maybe needed to increase the chances of diagnosing their particular problem.

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- July 2004 - The heat is on
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- May 2004 - Bacterial pneumonia in foals
- April 2004 - Digital radiographs
- March 2004 - Colic in the post-foaling broodmare
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