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Running on Empty?

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There are a number of serious breathing problems which can significantly affect a horse's performance. Typically, horses with problems which reduce the amount of air entering the lungs tire during maximal exertion, such as racing exercise, and these horses often make an abnormal breathing noise. The first step toward identifying the location of the obstruction is to have a comprehensive endoscopic examination performed by an experienced veterinarian. Many problems, such as vocal cord and flap lysis (left laryngeal hemiplegia or "roaring"), can be accurately confirmed based on the results of physical and resting endoscopic examination.

During the last ten years, it has become clear that many breathing problems only manifest themselves during high-speed exercise and can easily be completely missed or badly misdiagnosed during a resting examination. A typical scenario is a horse that works 3/8 of a mile well in the morning, but perhaps makes a vague noise. During racing exercise the horse tires dramatically, often as early as the 1/4-pole in a six-furlong race. The jockeys comment that they felt they had "a ton of horse under them" and "were going to win for fun under a hand ride" but suddenly the horse began to make a breathing noise and choked down, backing through the field or at the very least hanging at the wire. Unfortunately, after the horse is pulled up and catches its breath, the noise immediately stops. The after-race scoping is uneventful with perhaps a little bit of mucus, and some reddening or pharyngitis noted by the veterinarian. What can be done to resolve this frustrating dilemma? The answer often involves scheduling a high-speed treadmill evaluation at New Bolton Center.

Before it goes on the treadmill, every horse receives a comprehensive physical

examination which includes endoscopic examination, examination of the heart and lungs with a stethoscope and with ultrasound, and a detailed lameness evaluation. If no abnormalities are detected, horses are first schooled to the treadmill to make them comfortable with the feeling of the ground being pulled out from underneath them. To get the most useful information from the test, it is important that the horses be fit and able to perform at near maximal exertion for their particular occupation.

The high-speed treadmill portion of the examination is then performed by a

The most common problems, such as roaring and choking down caused by intermittent dorsal displacement of the soft palate, can usually be easily confirmed. A number of other problems which absolutely cannot be diagnosed without a high-speed treadmill evaluation have also been identified. One of these, termed axial deviation of the aryepiglottic folds (ADAF), results in severe narrowing of the airway just in front of the opening to the flaps, every time the horse takes a breath (Figures 1A and 1B). Dynamic collapse of this tissue into the airway usually causes the horse to make an abnormal respiratory noise and to tire during strenuous exercise.

This problem has been diagnosed most commonly in Thoroughbred racehorses (80%) but has also been identified in Standardbred

(13%) and in Arabian (7%) racehorses. Laser removal of this apparently flaccid or redundant tissue causing the problem usually can be done safely on the standing awake horse on a same-day outpatient basis. Dr. Eric Tulleners, Chief of Surgery at New Bolton Center, who developed the "no-touch" technique, performs the surgery using a 600 μ outer diameter laser fiber through the hollow channel in the videoendoscope with the image of the horse's throat projected on a color monitor. The surgery is done with the horse sedated and the throat numbed with a topical anesthetic. As in arthroscopic surgery, traction on the tissue to be removed is necessary. Traction is placed using custom-designed long grasping forceps introduced up the horse's other nostril. The laser quickly and efficiently cuts tissue and coagulates blood vessels. Bleeding is usually negligible. Anti-inflammatory medication is given after the surgery. Horses are typically restricted to shedrow exercise or small paddock turnout for two weeks



Figure 1A

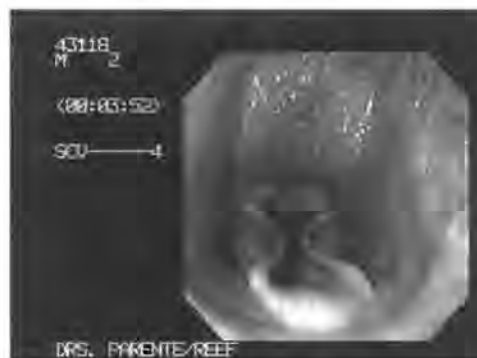


Figure 1B

team of experienced staff members and veterinarians who have performed over 1,200 clinical evaluations, more than any other facility in the country. During the evaluation, the horse's heart rate and rhythm is continuously monitored by telemetry and later evaluated for arrhythmias which can develop during strenuous exercise. The distance traveled and maximal speed are carefully controlled and adjusted according to the individual horse's level of fitness.

The horse's pharyngeal and laryngeal function is continuously monitored with a state-of-the-art videoendoscope. The scope allows the image to be seen in exquisite detail in full color on a 20-inch monitor, as well as recorded on standard videotape. Photographs of any abnormalities that are found can be made from the videotape for the owner, trainer, veterinarian, and the medical record. After the examination, the videotape can be scrutinized in super slow motion, frame-by-frame, to detect even the most subtle abnormality.

after surgery to allow for complete healing of this delicate area.

The results of a study of this problem were presented by Dr. Dana King, a surgery resident working with Dr. Tulleners at New Bolton Center, at the 1997 annual Scientific Meeting of the American College of Veterinary Surgeons in Orlando, Florida. Dr. King reported that complications were not encountered, and healing was uniformly unremarkable. Laser surgery definitely improved racing performance on 73% of racehorses and eliminated noise in 75% of horses. In comparison, horses with ADAF that did not undergo surgery and that were rested for less than two months usually did not improve in racing performance when training was resumed.

As an example, ADAF was diagnosed in a talented horse who was the winner of multiple races and had earnings in excess of \$400,000. The trainer recognized a breathing problem after the horse atypically performed poorly in a race. Working carefully with the local track veterinarian, they were able to localize the problem to the throat region, but could not pinpoint the exact site. A high-speed treadmill evaluation at New Bolton Center performed by Dr. Eric Parente, a member of the Section of Sports Medicine and Imaging, confirmed the problem of ADAF. Standing laser surgery was performed to correct the problem, and the horse convalesced without complications. In the first start back the horse was back to usual form, winning handily.

While ADAF has been recognized only in recent years, it does illustrate the need for a high-speed treadmill evaluation in horses with suspected breathing problems.

"A comprehensive high-speed treadmill performance evaluation is a time-consuming, labor-intensive test which is not inexpensive to conduct due to the equipment and professional expertise needed. However, these caveats aside, I am convinced that the examination is an incredibly valuable diagnostic tool which is a worthwhile investment for owners and trainers with a horse which is not training up to its potential due to a suspected breathing or cardiovascular problem," commented Dr. Eric Tulleners. ■

Continuing Education Opportunities for Graduate Food Animal Veterinarians

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The University of Pennsylvania School of Veterinary Medicine participates in a number of Food Animal Continuing Education (CE) programs. The content of these courses reflects the on-going change in food animal agriculture and the demands of veterinarians to address these emerging issues.

• **Dairy Production Medicine**

Certificate Program: This joint program sponsored by Penn State and the University of Pennsylvania involves ten three-day modules given over a period of three years, including nutrition (heifer, dry cow, and lactating cow), housing and facility design, mastitis control programs, reproductive management, farm finances, and herd expansion. Many experts from throughout the country, including faculty from both the University of Pennsylvania School of Veterinary Medicine and Pennsylvania State University, teach in this CE program which results in a Dairy Production Medicine Certificate.

• **Software Development:** Faculty members at the School of Veterinary

Medicine's New Bolton Center are continuously involved in software development which can be used to teach veterinary students and post-graduate veterinarians.

• **Penn Annual Conference:** Two-day seminars have been given on Culling, Nutrition, Economics, Reproduction, Pregnancy Wastage, and Heifer Management with national and international speakers.

• **M.B.A. Program:** The School's CAHP has a joint MBA program with Penn's Wharton School that integrates the underlying principles of animal health and economics in livestock production systems. Through the Wharton MBA program, basic fundamental skills and principles in economics, finance, cost accounting, and operations research are covered. Students also complete an application project that explores the use of these principles to a problem in animal production. (n.b. There is also a concurrent VMD/MBA degree program at Penn.) ■

Veterinariae Medicinae Doctoris (V.M.D.) degree

It takes four years of graduate studies to earn a V.M.D. degree. The first two years are spent in lecture and laboratory, covering such basics as anatomy, biochemistry, physiology, embryology, pathology, and nutrition to lay the foundation for the clinical exposure in the third and fourth years. During the third year the students are increasingly exposed to clinical teaching and begin to have hands-on experience with animal patients. At the end of the third year each student selects one of five "tracks": Small Animal, Large Animal, Large and Small Mixed, Equine, or Food Animal. During the fourth year students experience clinical rotations consisting of six foundation and 18 elective blocks.

For students interested in both veterinary medicine and business, the school of Veterinary Medicine and Penn's Wharton School offer a combined course leading to the joint degrees of V.M.D. and M.B.A. This rigorous joint program involves five to six years of study. (There is also a M.B.A. program for graduated veterinarians; please see "Continuing Education Opportunities.") A six-to-seven year program of study leading to both a V.M.D. and Ph.D. degree is available for a small number of highly-motivated, highly-qualified students interested in in-depth research.