Clinical Evaluation of Poor Training or Racing Performance in 348 Horses (1992–1996)

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A definitive diagnosis was made in 74.1% of 348 horses presented for poor performance and receiving exercising high-speed treadmill videoendoscopy, preexercise, and exercising electrocardiograms, preexercise and postexercise echocardiography, and serum muscle enzyme sampling. Authors’ addresses: Dept. of Clinical Studies (Section of Sports Medicine and Imaging), New Bolton Center, University of Pennsylvania, 382 West Street Road, Kennett Square, Pennsylvania (Martin, Reef, and Parente); Dept. of Clinical and Population Science, Veterinary Teaching Hospital, University of Minnesota, 1365 Gortner Avenue, St. Paul, MN 55108 (Sage). © 1999 AAEP.

1. Introduction
The diagnosis of poor performance in equine athletes is difficult because the problems causing poor performance are often manifested only at medium to high speed and may have a multifactorial etiology.1 Traditional methods of evaluation of poor performance include a complete physical and lameness examination and clinicopathological evaluation. High-speed treadmill videoendoscopy, exercising telemetric electrocardiography, and stress echocardiography add a new dimension to the examination of horses with poor performance,2–11 and were used to evaluate poor performance in 348 high performance horses.

2. Materials and Methods
The case records of all horses (N = 348), presented to the Jeffords High Speed Treadmill Facility, School of Veterinary Medicine, New Bolton Center, University of Pennsylvania from August 1992 through March 1996 with a history of poor performance, were examined. All horses received a physical examination, lameness examination, resting and exercising videoendoscopic examination, preexercising and postexercise radiotelemetric electrocardiography, preexercise and postexercise stress echocardiography and preexercise and postexercise serum muscle enzymes.

A. Videoendoscopy
Videoendoscopy was performed using a 100-cm-long, 9.8-mm diameter flexible videoendoscope passed up the right ventral meatus, positioned just caudal to the guttural pouch openings, fixed to the noseband of the halter, and recorded using a Super VHS VCR.

B. Echocardiography
Echocardiograms (M-Mode and 2-D) were performed with a 2.5-MHz sector scanner transducer at rest and immediately after exercise.
C. Electrocardiography
A continuous base apex electrocardiogram was performed with radiotelemetry on each before, during, and 5 minutes after exercise.

D. High-Speed Treadmill Exercise Protocol
Horses were first acclimated to the high-speed treadmill (HSTM). Thoroughbreds were exercised without tack. Standardbreds wore their racing equipment.

E. Stress Test Protocol
1. Phase I
Warm-up; exercise at 7 m/s for 1600 m.

2. Phase II
Placement of the twitch, fixation of the videoendoscope, removal of the twitch, and increase in speed.

3. Phase III
Increase in speed and/or incline to increase maximum heart rate (MHR) to 200 beats per minute (bpm) or more for 1600 m and slow down from exercise. The horse is removed from the treadmill and immediate postexercise echocardiography performed. The total test distance was 2800 m and the test individualized for the fitness level of each horse.

F. Serum Muscle Enzyme Analysis
Blood was drawn from the left jugular vein with a 20-gauge needle and Vacutainer and placed in a serum tube before and 30 minutes postexercise. All horses that had a serum creatinine phosphokinase level of more than 1000 IU/L were determined to have subclinical myopathy.

3. Results
Significant upper respiratory tract abnormalities were a cause of poor performance in 148 horses (42.6%) undergoing an HSTM examination. The most common exercising abnormality was dorsal displacement of the soft palate (DDSP) in 43 (29%), followed by dynamic collapse of grade I, II, III, or IV left laryngeal hemiplegia (LLH) in 33 (22.3%). Thirty-nine of these horses (26%) had more than one upper airway problem. Cardiac disease was a primary or secondary cause of poor performance in 77 horses (22.1%). Exercise-induced cardiac arrhythmias occurred in 102 horses and were the most common cardiovascular cause of poor performance. Forty-one of these had significant ventricular arrhythmias, and the majority of these horses (53%) also had significant upper airway abnormalities. Clinical or subclinical myopathy was present in 63 horses (18.1%). Significant lameness was detected during the exercise in 15 horses (4.3%). A definitive diagnosis was made in 259 horses (74.1%) presenting for poor performance.

4. Discussion
In a previous study, 66 of 164 horses (40.2%) with poor performance that presented for a high-speed upper airway evaluation had an upper airway abnormality detected. In our study, a similar percentage of horses examined for poor performance at speed, 148 (42.6%) had an upper airway abnormality detected; 39 of these horses (26.3%) had multiple upper airway abnormalities. Left laryngeal hemiplegia was the most common upper respiratory tract abnormality detected at rest, followed by DDSP and pharyngeal collapse, both detected during high-speed exercise.

Preexercise and postexercise stress echocardiography has not been reported in horses undergoing clinical exercise testing. In our study, left ventricular dysfunction was apparent in 5.5% of horses immediately after exercise; in eight of these 19 horses (42.1%), evidence of mild left ventricular dysfunction was also present at rest. Preexisting myocardial disease is likely in horses presenting with low shortening fraction at rest and is probably the cause of postexercise left ventricular dysfunction.

5. Conclusions
We recommend a complete evaluation including an HSTM examination in horses with poor performance with or without an abnormal upper airway noise, and with Grade II or III left laryngeal hemiplegia. We strongly recommend the use of exercising radiotelemetric electrocardiography and preexercise and postexercise echocardiography.

References and Footnotes
9. Reef VB. Electrocardiography and echocardiography in the exercising horse. In: Robinson NE, ed. Current therapy...


*GIF-Q Gastroscope, CLV V 20 light source and CV-100 image processor, Olympus, Columbia, MO.

*SVo 9500 MDX videorecorder, Sony Electronics Medical Division, Montvale, NJ.

*Opus One or Impact, Universal Medical Systems, Inc., Bedford Hills, NY.


*Classic 4000 High Speed Equine Treadmill, Walmanik International Corp., Freedom, PA.