Functional Electrical Stimulation of Intrinsic Laryngeal Muscles in Exercising Horses

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Functional electrical stimulation represents a promising strategy for restoration of function in denervated laryngeal muscle. Authors’ addresses: Department of Clinical Sciences (Regner, Cheetham, Soderholm, Mitchell, Ducharme), Auburn College of Veterinary Medicine (Priest), Hackensack University Medical Center, (Sanders), 30 Prospect Avenue, Hackensack, NJ, 07601; Institute for Ageing and Chronic Disease, University of Liverpool, UK, L69 3GE (Jarvis). e-mail: jc485@cornell.edu. *Corresponding author. © 2011 AAEP.

1. Introduction
Recurrent laryngeal neuropathy (“roaring”) is a major cause of poor athletic function in performance horses, with a prevalence of 8% in Thoroughbreds. Recurrent laryngeal neuropathy leads to dynamic airway collapse with upper airway obstruction at exercise and alveolar hypoventilation with hypoxemia.

2. Methods
In this study, the feasibility of functional electrical stimulation (FES) for equine recurrent laryngeal paralysis vocal fold paralysis was explored by testing arytenoid abduction evoked by electrical stimulation of the dorsal cricoarytenoid (DCA) muscle. Rheobase and chronaxie were determined for innervated DCA muscle. We then tested the hypothesis that direct muscle stimulation can maintain airway patency during strenuous exercise in horses with induced transient conduction block of the laryngeal motor nerve. Six adult horses were instrumented with a single bipolar intramuscular electrode in the left DCA muscle.

3. Results
Rheobase and chronaxie were within the normal range for innervated muscle at 0.55±0.38 V and 0.38±0.19 ms, respectively. Intramuscular stimulation of the DCA muscle significantly improved arytenoid abduction at all levels of exercise intensity, and there was no significant difference between the level of abduction achieved with stimulation and control values under moderate loads. Additional promising data from an experimental study using FES to stimulate the DCA muscle after 3 months of denervation will also be presented.

4. Discussion
FES represents a promising strategy for restoration of function in denervated muscle.

Research Abstract

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