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A STUDY OF THE NERVE SUPPLY AND INTRINSIC
MUSCULATURE OF THE EQUINE LARYNX

A thesis presented in partial fulfilment of the
requirements for the degree of Master of Veterinary
Science in Veterinary Surgery at Massey University

by

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ABSTRACT

The purpose of the study was to elucidate the structure and function of the normal equine laryngeal nerve supply and musculature. This was undertaken as a preliminary step for further examination of equine laryngeal hemiplegia or recurrent nerve paralysis.

A literature review of anatomy and function of the nerve supply and intrinsic musculature was prepared.

The experimental study was divided into two main sections, the first being an anatomical study, the second being confined to laryngeal function.

ANATOMICAL STUDY:

Six horses were used to supply the gross anatomy and nerve supply of the intrinsic laryngeal muscles. Transverse sections were taken of the vagus, and recurrent laryngeal nerves at various points, these being submitted for histological examination. It was apparent that the gross anatomy of the larynx and its nerve supply was similar to that described in the literature. However, the intra-laryngeal nerve distribution had not been described so this was subsequently studied in detail. The nerve supply appeared to be unilateral and both cranial and recurrent laryngeal nerves supplied the intrinsic musculature.

Histological examination of the nerves showed that in the vagus, nerve fibres were of a mixed population composed of fine, medium and heavily myelinated fibres. These appeared to decussate and coalesce in a complex manner along the nerve. In the recurrent nerve, however, the majority of nerve fibres were of a medium myelinated type. In the

intralaryngeal nerve only medium fibres were found.

FUNCTIONAL STUDY:

In this study fourteen horses were investigated using electromyographic techniques, to establish the activity of the intrinsic laryngeal muscles during respiration. The dorsal cricoarytenoid muscle was confirmed in its "abductor" activity while the cricothyroid muscle in some horses also showed increased activity during inspiration. All other intrinsic laryngeal muscles showed "adductor" or expiratory activity. Once the normal resting respiratory activity of the laryngeal muscles was established, selective denervation of individual muscles was undertaken to confirm the anatomical findings. The dorsal cricoarytenoid muscle was supplied by a branch of the recurrent laryngeal nerve. The cricothyroid muscle was supplied by the external branch of the cranial laryngeal nerve. All other intrinsic laryngeal muscles were supplied from two branches of the recurrent nerve. Motor nerve supply was unilateral.

A further study was performed using a random sample of twenty four horses. In this investigation the intrinsic laryngeal muscles were dissected off their respective cartilages and weighed, the muscles from the left side being compared with those from the right. For those muscles supplied by the recurrent nerve, the muscles of the left side were significantly lighter than those of the right. Comparison of the cricothyroid muscles, however, showed no significant difference between left and right sides. Comparison of the denervated right muscles with the contralateral muscle after six weeks did not seem to alter this

finding. Conventional histological examination of denervated muscle at six weeks post nerve section failed to show any significant signs of denervation atrophy.

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