
Ph.D. THESIS

Diagnostic and therapeutic investigations in neurological disorders in dogs and cats

(ABSTRACT OF Ph.D. THESIS)

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INTRODUCTION

Currently, neurological diseases are quite frequent in animals and are often real challenges in diagnosis and treatment. The anatomical components and neuroendocrine systems involved in certain neurological dysfunctions are very complex, with very few diseases with pathognomonic symptoms. Thus, different diseases may have similar symptoms, and some specific diseases may have a varied clinical picture. A logical and orderly approach by the clinician in examining an animal suspected of a neurological disorder leads to a correct diagnosis and the possibility of locating the lesion from the anatomical point of view. Often, the omission of some stages in the clinical examination leads to the failure to identify signs of disease and, implicitly, to elaborate an incorrect diagnosis (MALIKIDES SI COLAB., 2000). Minimum knowledge about each segment of the nervous system's functioning will help the clinician interpret the results of the neurological examination correctly.

THE STRUCTURE OF THE THESIS

The present thesis is structured into eight chapters.

The first chapter describes in detail the structure of the central and peripheral nervous system.

The second chapter examines the nervous system. Currently, neurological disorders in animals are more frequent and diagnosed due to the understanding of functional neuroanatomy, the production of physiopathological mechanisms, and the extraordinary impact of paraclinical medical imaging methods that have greatly expanded the field of investigation in neurology. To all these findings it is added a logical and coherent staging of the physical and neurological examination upon which the clinician must first determine whether the clinical signs are due to damage to the nervous system and if the answer is positive, he will have to determine the location and the nature of the lesion (GUALTIERO SI D'ANGELO, 2013).

Determining a diagnosis of the neurological disorder has always been a rather difficult process due to the ambiguity and complexity of symptoms, the pathophysiological mechanisms involved, and etiology's diversity. (GHERGARIU, 1995).

Chapter 3 is intended for neurological evaluation in carnivores, which begins with examining the head and cranial nerves, continues with examining the spine and spinal cord, followed by the examination of the neck and chest, torso, pelvic members, anus, and tail. In the end, the peripheral nerves will be examined. Depending on the body segment under examination, both a functional and a physical (morphological) examination will be performed, using different diagnostic tests that will determine the lesion's location and, finally, the clinical diagnosis. Based on this diagnosis, the clinician

will perform other complementary examinations to guide the diagnosis of the disease's etiology.

During the neurological examination in animals, the clinician must establish the following elements: neurolocation, nature of the lesion (irritative, inflammatory, degenerative); its topography (focal, multifocal, diffuse), and etiology (germs: infectious, parasitic, toxic, metabolic, physical factors, hereditary factors). The working instruments used in the clinical examination are represented by the reflex hammer, hemostatic forceps, flashlight, cotton swabs, xylene, saline solution. For each neurological test applied, the following aspects were followed: the elements evaluated by the test, normal test response, abnormal test response. Based on the answers obtained, the clinical neurological diagnosis is determined.

Chapter 4 contains the complementary examinations used in neurology that can be grouped into several methods represented by biological analyzes, medical imaging, electrography, histological analysis, plus other examinations, depending on the species and the affected body segment.

Chapter 5 is intended for the purpose and objectives of the research. The neurological examination aims to test the integrity of the nervous system segments and identify any functional deficiency. In determining the anatomical diagnosis, both the results confirm that certain segments of the central or peripheral nervous system are unchanged, and those that confirm the presence of pathological changes are equally useful (DE LAHUNTA SI GLASS, 2009). The neurological evaluation interpretation can begin by drawing up a list containing information about the changes detected following the anamnesis and the clinical examination. Each notified change must be correlated with a specific region or location in the central or peripheral nervous system.

The purpose of this research was to develop a diagnostic decision tree and to establish a working protocol in neurological disorders in dogs and cats to locate the lesion, its nature, and etiology, taking into account the clinical and paraclinical correlations. At the same time, the purpose was to establish standard procedures for clinical examination of the patient with neurological manifestations and to identify the limits of paraclinical examinations.

The objectives of the thesis. In order to fulfill the purpose, the following objectives have been set:

- performing a meta-analysis of data from the literature that refer to the pathology of the nervous system in carnivores;
- identification of biological material and clinical and paraclinical working methods in the diagnosis of neurological disorders;
- staging the neurological consultation;
- determining the anamnestic behavior and the clinical examination of the patient;
- application of differential diagnostic tests;

- interpretation of data obtained from imaging and laboratory examination; developing and applying a therapeutic protocol.
- statistical analysis and interpretation of the data obtained in order to provide a robust scientific argument for research and the elaboration of scientific articles.

Chapter 6 describes the diagnosis and therapy of neuro-cerebral diseases in carnivores. The craniocerebral diseases studied were represented by generalized or focal lesions located in the cerebellum's hemispheres in the form of abscesses, cysts or tumors, and craniocerebral traumas. The inclusion of these diseases in the research had as a decisive argument that in this type of pathology, the clinical manifestations start suddenly and have a dramatic evolution, which requires emergency intervention. In the case of craniocerebral disorders, the clinician should use standard animal examination procedures and medical and laboratory imaging examinations to determine the etiology of the disease. For the certainty of a diagnosis, paraclinical methods bring more information in determining the etiology of the disease and in organizing the interventional protocol. Rapid changes in digital technology have created opportunities for the development of high-quality equipment in practical medical imaging. Thus, ultrasonography, radiography, computed tomography, magnetic resonance imaging, electroencephalography, and determination of auditory evoked potential are considered key investigative methods in establishing an image diagnosis. Through their judicious use, the limits of a technique can be overcome by using other techniques.

Chapter 7 is dedicated to the diagnosis and therapy of the spine and spinal cord disorder in carnivores. The inclusion of disorders located in the spine and spinal cord in the research had a decisive argument that a large part of these disorders, similar to craniocerebral, begin suddenly; the animal cannot move due to paresis paralysis, which requires emergency intervention. If the consciousness is altered in cerebral disorders in those of the spinal cord, the consciousness is preserved. However, the gait is strongly altered, making the orthopedic examination mandatory and completing the neurological examination. Congenital spinal disorders are less commonly diagnosed in dogs, many of which are discovered by chance. This type of disorder occurs due to improper embryonic development (BAILEY SI MORGAN, 1992). The most frequent abnormalities of the spine that can be found in carnivores are represented by changes in the number of vertebrae, vertebral block, or incompletely developed vertebrae. Spinal deformities can be caused by scoliosis, kyphosis, or lordosis. However, following the cases' examination, most of the dogs and cats studied showed changes that were clinically manifested by pain and by adopting particular positions. Lumbar block vertebrae have been diagnosed in elderly individuals and occur in deforming spondylosis. In this case, the spondylosis beaks that form on the vertebrae's ventral side join to form a bone block. Conditions due to misalignment of the vertebrae include dogs with Wobbler syndrome, but also other conditions. Deforming spondylosis (CARNIER SI COLAB., 2004), diffuse idiopathic skeletal hyperostosis, found in young

animals (MORGAN SI STAVENBORN, 1991), spondylitis and discospondylitis (SHAMIR SI COLAB., 2001), neoplasms and degenerative disorders (THRALL, 2007) completes the clinical picture of spinal disorders. Spinal cord trauma can cause, depending on its depth, both extramedullary and intramedullary lesions.

In situations where the diagnosis cannot be determined based on conventional radiological examination, it is recommended to perform myelography with a radiocontrast agent. Myelography with contrast agent is applicable especially in situations where soft tissues that are radiolucent are involved, including in this category cervical intervertebral discopathy, lumbar intervertebral discopathy, type I and type II disc protrusion, various neoplastic processes that can affect both bone tissue as well as meninges, as well as in the case of hematomas.

Chapter 8 is dedicated to the examination of the auditory analyzer in carnivores. Auditory evoked potential or BAER test is the only definite diagnostic method to detect congenital/hereditary deafness as early as possible and deafness acquired in dogs and cats or to diagnose the presence of lesions in the brainstem.

Chapter 9 presents general conclusions.

Chapter 10 emphasizes the originality and innovative contributions of the thesis.

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