SUMMARY

The purpose of this thesis is to approach pathologies with spinal pathologies from a clinical and paraclinical point of view, in order to obtain a definite diagnosis and apply a specific therapeutic protocol.

The thesis is structured in two main parts, the first part including 2 chapters in which current notions are described regarding the etiology, incidence and diagnosis of the most common spine pathologies as well as the electrodiagnostic methods that can be applied in order to identify neurological lesions with prognostic role.

The second part refers to the own contributions and sums up 6 descriptive chapters, the first 5 being oriented towards various diagnostic modalities that follow paraclinical examinations such as advanced imaging and cerebrospinal fluid puncture, and the last chapter reports the therapeutic component according to the targeted pathology.

Chapter III is divided into two sections. The first part describes a retrospective epidemiological study based on the data recorded in the medical archive of the medical clinic during the years 2015-2018. The study aimed to analyze the data from the point of view of the incidence of spinal pathologies in companion dogs and the most frequently affected spinal segments.

The most common lesion of the spinal cord in dogs is disc herniation type 1 or 2. It is reported both in the study carried out and in the specialized literature that the two pathologies present an evolution influenced by breed and age.

Thus, 524 neurological patients were registered, of which 118 were included in this study and analyzed demographically for the following factors: race, sex, age and neurolocalization of the spinal pathology.

Thoraco-lumbar syndrome was identified in 50% of cases with the highest incidence, while lumbo-sacral syndrome was constituted in only 11% of cases. The results showed that in terms of breed, 56% of patients with thoracolumbar spinal cord syndrome were from the mixed breed category, followed by Bichon with 29%. The beagles dog breed showed a predisposition to cervical injury (15% of all cases), the bichon breed 12% for the cervico-thoracic region. Also from the mestizo category, 17% were identified with lesions in the lumbo-sacral region.

In terms of gender, the incidence of spinal pathologies was higher in males than females. Analyzed by the spinal segments of interest, females showed a higher incidence only for pathologies in the cervical segment.

Patients younger than 6 years and older than 6 years had approximately equal incidence of thoracolumbar syndrome, 57% and 58%. Based on these data, it was possible to conclude that there are breeds with a predisposition to some pathologies for the thoraco-lumbar and cervical spinal segments, the highest incidence being on the T3-L3 region.

Chapter IV describes a diagnostic algorithm built on a summary of key questions from the history, clinical and neurological examination, and literature.

Thus, based on these data, a specific diagnostic algorithm could be created for pathologies with evolution on the thoraco-lumbar segment.

The algorithm was created according to the following inclusion criteria: mode of evolution - acute and progressive, acute and non-progressive and chronic; age of the patient (young, adult, geriatric); the presence or absence of pain; symmetry or asymmetry of the lesions; the best imaging protocol (radiography, myelography, C.T., M.R.I.) and other additional paraclinical examinations (CSF puncture, histopathological examination).

The obtained data were materialized in a table systematized in a diagnostic algorithm. Thus, pathologies with acute and progressive evolution are represented by: disc extrusion (IVDE type 1) and meningoencephalitis of unknown origin (MUE). Acute non-progressive nucleus pulposus extrusion (ANNPE), acute compressive hydrated nucleus pulposus extrusion (HNPE) and ischemic myelopathy (IM) present a form of acute and non-progressive evolution. Disc protrusion (IVDP), neoplastic processes, degenerative myelopathy (DM), spondylosis deformans (SD) and discospondylitis are classified as pathologies with chronic evolution.

Canine patients were grouped into three age categories: young (IVDD type 1), adults (over 7 years – ANNPE, HNPE, SD, DM) and geriatrics (IVDP type 2, neoplasia).

From the point of view of pain, this clinical symptom is present in disc extrusions, in some situations of disc protrusion, spinal inflammatory diseases and some neoplasias with meningeal involvement.

The asymmetry of the lesions was another criterion included in the construction of the diagnostic algorithm. Thus, lesional asymmetry is identified in acute non-compressive nucleus pulposus extrusion, some cases of acute hydrated nucleus pulposus extrusion and fibrocartilaginous embolism, but it can also be found in some neoplastic phenomena with medullary or nerve root involvement.

Native radiography is a useful diagnostic method for DS, neoplasia, vertebral fractures or dislocations, and discospondylitis, but is not recommended for the diagnosis of MUE, SEE, ischemic and degenerative myelopathy. Advanced imaging such as myelography and computed tomography is a more reliable method of diagnosis for IVDE, ANNPE, HNPE, IVDP, ischemic myelopathy, neoplasia, DM, SEE, discospondylitis and spondylosis deformans.

However, MRI is the gold standard for every spinal cord pathology. This algorithm is designed and intended to be a useful guide for everyday veterinary medical practice regarding thoracolumbar spinal cord diseases in dogs.

Chapter V reports a description of inflammatory pathologies of the spine, the most common being steroid responsive meningitis-arteritis. Based on the data obtained, we developed a scientific study documented on the basis of 6 clinical cases.

Meningitis-steroid-responsive arteritis (SRA) is an inflammatory pathology of the central nervous system, frequently encountered in medium and large canine youth, under 2 years of age.

Cerebrospinal fluid examination represents the diagnostic method with the highest degree of fidelity in the diagnosis of inflammatory diseases of the central nervous system (CNS).

In this study, six patients were included, with a clinical presentation represented by hyperthermia and hyperalgia on paraspinal palpation of the cervical segment.

The paraclinical examinations performed concerned the dosage of serum C-reactive protein (CRP), the cytological examination of the cerebrospinal fluid, as well as the determination of total proteins in the CSF.

For 33% of the evaluated patients, the neurological examination revealed proprioception and/or locomotion deficits. The evolution of patients with MASR was acute and progressive. The initiation of medication was based on the results obtained following the CSF puncture, where increases in cellularity and proteinorrhagia were identified. At the same time, the cytological examination identified an increase in inflammatory cells.

The medication of choice was based on corticosteroids, with prednisone being the most affordable and well-tolerated medication. The dosage of the medication was adjusted according to a well-documented protocol, in the first 12 days a dose of 1mg/kg every 12 hours was administered, later with its reduction to 0.5mg/kg every 12 hours and the increase of the administration interval depending on the way of evolution.

All 6 patients showed a favorable response based on the administration of prednisone medication, without the occurrence of major adverse effects but only transitory digestive disorders.

Chapter VI reports a series description of patients in whom the final diagnosis was confirmed on the basis of CT and illustrated the presence of peripheral nerve root tumors.

For this chapter, 3 patients were selected, geriatric patients over 11 years old, whose symptoms took on a form of chronically progressive clinical evolution. Only patients who did not present other comorbidities or metastases with the identification of formations at the thoracic or abdominal level were included in the study.

In two of the three cases, tumors were identified on the cervical segment with cervico-thoracic involvement towards the nerve roots and a single patient with a neoplastic structure on the lumbo-sacral segment with involvement in the lumbar plexus.

The final diagnosis was based on the CT examination, no other changes were identified on the blood tests (hematology and serum biochemistry) except for one patient where the C-reactive protein values were above the physiological limit. From a radiological point of view, no changes correlated with clinical symptoms were observed.

The therapeutic protocol aimed to improve the quality of life, the patients being medicated with corticosteroids for a period of approximately 4-5 weeks. Two out of three subjects showed a favorable evolution with remission of neurological deficits. One patient was declined medication due to the owner's wish for euthanasia.

Chapter VII describes a study on a group of 9 patients from the perspective of cardiac variability in which disc pathologies were identified on the thoraco-lumbar segment.

Heart rate variability (HRV) is the oscillations in the interval between normal successive heartbeats as a result of the activity of the autonomic nervous system. The balance between sympathetic and parasympathetic activity of the autonomic component can be monitored through VRC.

Until now, the veterinary literature has not presented studies with reference to changes in heart rate variability in canine patients with pathologies at the spinal level. The only data that can be used to develop a study in this direction, access the research literature in human medicine.

Through a series of studies in which individuals with spinal cord injuries were taken as research subjects, it could be seen that changes occur in the HRV depending on the location of the spinal cord injury.

Thus, if the injury occurred above the T4 segment, the autonomic innervation of the vegetative system with action on the functionality of the heart is preserved, but the innervation of the lower limbs and the sphincteric organs changes and at the same time, the heart rate in patients at physical rest being higher than in those normal.

If the lesion is located below the T4 spinal segment, then cardiac autonomic functionality will be affected through the orthosympathetic component, with the heart rate being lower compared to normal subjects.

Also, injury severity is an important factor in changes in HRV. Depending on the type and degree of spinal injury, VRC has been shown to show lower values in non-ambulatory (paraplegic) patients compared to ambulatory patients.

In the current study, it was observed whether in patients with lesions in the T3-L3 segment changes occur in the sphere of parameters specific to cardiac variability. All studied patients were diagnosed with type I disc herniations, in the T3-L3 segment, to which nonsteroidal anti-inflammatory drugs were administered.

Following the analysis of the obtained data, from a statistical point of view no changes were observed in relation to the control group. Of course, the study also has a number of limitations such as: not knowing the impact of nonsteroidal anti-inflammatory medication on cardiac variability, the small study group as well as the affected spinal segment of interest.

Chapter VIII is the last chapter of this work and highlights the most important aspects regarding the therapy of spinal pathologies. In order to achieve a more specific demarcation, the patients included in the study were grouped into degrees of locomotor dysfunction. Depending on the identified pathology and the associated degree of dysfunction, a specific therapeutic protocol was established.

Thus, patients classified in grades I and II showed a favorable evolution in the association of medication with non-steroidal anti-inflammatory drugs. Those in grade III were recommended for conservative medication with NSAIDs and neurosurgical examination in case the clinical evolution is accentuated to grade IV. Patients in grades IV and V were referred for advanced imaging and surgery for spinal pathologies. In the case of neoplastic pathologies, surgery was declined, but corticosteroid-based medication was instituted.

In patients whose final diagnosis was compatible with a non-infectious inflammatory process, AIS medication was instituted, and in those with an infectious origin (discospondylitis) medication based on analgesics and antibiotics and non-steroidal anti-inflammatories was recommended and applied.
In patients in whom a final diagnosis could not be obtained, a spinal segment was assigned and the therapeutic triad was applied according to clinical presentation, neurological deficits, clinical course, and individual data such as sex, age, or race.

The last element of this thesis is represented by a selective description of some general conclusions regarding the most important aspects observed in this doctoral thesis.