

S U M M A R Y

IMAGING AND LABORATORY DIAGNOSIS OF THORACIC DISEASES IN DOGS AND CATS

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Key-words: broncho-alveolar lavage, cat, computer tomography, cytological examination, dog, radiography, thoracic diseases.

Thorax diseases in dogs and cats represent a wide range of pathologies that may affect one or more thoracic structures.

The respiratory system is one of the vital functions of an organism, any disorder at this level can lead to dysfunctions by affecting the thoraco-pleuro-pulmonary tract.

Symptomatology of thoracic and respiratory disorders is the main reason why animal owners are presenting to the veterinarian. Anamnesis should always be correlated with an objective clinical examination and complemented with imaging investigations (radiography, ultrasound, CT, MRI) and/or laboratory (puncture, broncho-alveolar lavage, cytological examination, etc.) for a certainty diagnosis.

The aim is to correlate the present thoracic pathology in dogs and cats with specific or non-specific disease signs, imaging and laboratory aspects obtained through various classical or advanced methods in order to establish a certainty diagnosis and to define the importance of these methods in current veterinary medical practice.

The PhD thesis "**Imaging and laboratory diagnosis in thoracic diseases in dog and cat**" is structured in two parts, the first part being a bibliographic study, and the second part contains own research.

The studies were conducted at the University Clinic of the Faculty of Veterinary Medicine in Bucharest and at the University Clinic of the Faculty of Veterinary Medicine in Perugia, Italy.

First part consists of three chapters and represents a bibliographic synthesis from the specialized literature, representing approximately 30 pages (25%) of the total PhD thesis.

In Chapter I there are presented general anatomical aspects about thoracic structures and respiratory apparatus, as well as the physiology of respiratory function.

Chapter II describes disorders in the thoracic wall, pleural and pleural space, in mediastinum and pulmonary areas in dogs and cats.

In Chapter III there are detailed imaging diagnostics methods and techniques and sampling techniques for a certainty diagnosis.

The second part is structured into seven chapters (IV-X) representing approximately 90 pages (75%) of the PhD thesis. It includes the purpose of the study, materials and methods, results obtained and their conclusions. This part ends with general conclusions and bibliographic sources, which were 121 sources.

Chapter IV covers materials and methods used in the study. In the first subchapter there are presented the animals, which included 776 cases (436 dogs and 340 cats), aged between 3 weeks and 17 years, which were examined within the imaging departments of the two university clinics (Bucharest and Perugia) including biological samples taken for laboratory examinations.

The second subchapter describe the imaging techniques (radiographic, ultrasound, CT, magnetic resonance, bronchoscopy) and laboratory (sampling for cytological and microbiological examination) used in personal researches.

Chapter V presents the results obtained in dog and cat thoracic disorder. Were examined 71 dogs aged between 10 months and 15 years, as well as 52 cats, aged between 3 weeks and 13 years (123 cases) with respiratory pathology and who presented changes in the thoracic bone structure (congenital abnormalities, fractures and neoplastic processes) and soft tissues (soft tissue and diaphragm). The cases were examined by clinical and paraclinical methods at the university clinics at the Faculty of Veterinary Medicine in Bucharest and the Faculty of Veterinary Medicine Perugia.

In terms of lesions, the cases were divided into three categories: post-traumatic changes, congenital anomalies and neoplastic processes in the bone structure (sternum and rib) and extra-thoracal soft tissues (skin, fat, muscles, pleura and diaphragm).

Six cases (3 dogs and 3 cats) with changes in the sternum (2 post-traumatic disorders and 4 congenital anomalies) and 12 cases (7 dogs and 5 cats) with changes in the ribs (2 post-traumatic disorders, 3 neoplastic processes and 7 congenital abnormalities). Concerning extra-thoracal soft tissues neoplastic proceses, was recorded 33 cases (26 dogs and 7 cats) and post-traumatic diseases in 46 cases (24 dogs and 22 cats), the latter being, subcutaneous emphysema (17), haematomas (21) and contusions (23). In addition, in 26 cases (11 dogs and 15 cats) diaphragm disorders were identified, represented by congenital anomalies (2) and post-traumatic lesions (24). Post-traumatic injuries recorded the highest prevalence (74 cases). They were followed by neoplastic processes (36 cases), represented by mammary fibrosarcoma (17), mammary carcinoma (6), lymphoma (4), mastocytoma (2), osteosarcoma (2), chondrosarcoma (1), hemangiosarcom (1), liposarcoma (1) and the secondary ones were represented by metastases (2), and congenital changes (13 cases), represented by *pectus excavatum* and rib agenezia. Radiological examination has had diagnostic value in post-traumatic processes and in cases of congenital

abnormalities, and in the case of neoplastic processes, it has an orientative role. CT has played a major role in the diagnosis of neoplastic processes, providing important details about the depth of lesions through multiplanar and 3D reconstructions. The cytological examination was the one to diagnose the type of neoplastic process by highlighting specific cellularity.

Chapter VI contains the results obtained in the diagnosis of pleural and pleural space diseases. A total of 159 cases were studied, including 83 dogs and 76 cats aged between 5 months and 14 years who presented a pleural pathology. The cases were examined by general methods and complementary methods (radiography, ultrasound, CT, thoracocentesis and cytological examination) at the university clinics of the Faculty of Veterinary Medicine Bucharest and the Faculty of Veterinary Medicine Perugia.

Out of 159 cases of pleural effusion, 39 cases were exsudate, 11 cases were transsudat and 109 cases with modified transsudat, respectively 135 cases presented with liquid collection and 24 cases with gaseous collection.

Of these, 39 cases caused by inflammatory nature (20 septic and 19 aseptic), 52 cases caused by post-traumatic disorders (7 chilotorax, 21 hemotorax, 24 pneumothorax and combinations of there three - 9 cases) and 68 cases due to primary neoplastic processes (12 cases - sarcomas, carcinomas and lymphomas) or secondary (pulmonary metastases due to neoplastic mammary processes - 56 cases).

Imaging techniques (radiography, ultrasound, CT scan) have been used with a real impact on pleural effusions. The radiological examination was diagnostic in the case of gaseous collections and the identification of liquid collections. Thoracic ultrasound (TFAST) had a role in the diagnosis of pleural effusions, adding extra information on the amount of fluid, the presence or absence of fibrin flocs, and was also used to perform punctures and thoracocentesis. CT has been used predominantly in the diagnosis of pleural haemorrhagic and chilos diseases.

Toracocentesis had a dual purpose, namely in the therapeutic drainage of the liquid collection and diagnostic purpose in the evacuation of the specific cellularity of the liquid collection.

In Chapter VII there are presented cases diagnosed with mediastinal disorders. Mediastinal and mediastinal organs lesions (esophagus, trachea, lymph nodes) have been identified in 109 cases (78 dogs and 31 cats). Clinical examination methods, imaging methods (radiography, ultrasound and computer tomography), laboratory methods (fine needle aspiration from the mediastinal masses) were performed in the clinics of the Faculty of Veterinary Medicine Bucharest and the Faculty of Medicine Veterinary Perugia.

At mediastinal level 22 cases (14 dogs and 8 cats) of pathologies with post-traumatic etiology (9 cases - pneumomediastin) and 13 cases (neoplastic processes - chemodectoma and sarcoma).

The affections identified in the esophagus were in 27 cases (19 dogs and 8 cats), respectively: post-traumatic diseases (7 cases - foreign bodies), congenital disorders (13 cases - megaesophagus) and inflammatory diseases (7 cases - esophagitis).

At the level of the trachea, 29 cases (25 dogs and 4 cats) were presented with congenital disorders (21 cases of tracheal collapse and 3 cases of tracheal hypoplasia), inflammatory diseases (4 cases - tracheitis) and neoplastic processes (a case with mixosarcom).

At the level of lymph nodes, their reactivity was identified in 31 cases (20 dogs and 11 cats) following inflammatory processes (4 cases) and neoplastic processes (27 cases - the most common being pulmonary neoplastic processes).

Imaging and laboratory methods were used to diagnose mediastinal disorders. The radiological examination was performed in all cases with a diagnostic role in the case of post-traumatic disorders (pneumomediastinum), in foreign bodies blocked at the esophageal and tracheal level and in case of tracheal collapse and hypoplasia. In case of neoplastic processes, it had an orientative role and complementary exams such as ultrasound and CT were needed. The ultrasound was used for sampling. CT has a high sensitivity in the detection of mediastinal neoplastic processes and tracheal changes.

Bronchoscopy/endoscopy has been used in bronchial tract evaluation and for removal of foreign bodies stuck at the tracheal and esophageal level.

Imaging methods may be used individually or in combination to diagnose mediastinal disorders, but these should be corroborated with laboratory examinations to diagnose the type of neoplastic process.

Chapter VIII consists of pulmonary affections that were evident in 385 cases (49.62%) of the total chest disorder. Have been evaluated 204 dogs aged between 2 months and 17 years, as well as 181 cats aged between 3 months and 16 years who have had pulmonary diseases.

For the diagnosis of pulmonary lesions, complementary screening methods such as: X-ray, ultrasound, CT scan, broncho-alveolar lavage, bronchoscopy, fine needle aspiration, and cytological examination were used.

Inflammatory diseases were diagnosed in 149 cases and were represented by interstitial pneumonia - 49 cases (13%), lobar pneumonia - 39 cases (10%), acute bronchitis - 19 cases (5%), chronic bronchitis - 31 cases (8%) and feline bronchial asthma in 11 cases (3%).

Pulmonary circulatory disorders were diagnosed in 29 cases divided into cardiogenic pulmonary edema - 21 cases (5%) and noncardiogenic pulmonary edema - 8 cases (2%).

Post-traumatic disorders were evaluated in 54 cases and were represented by pulmonary haemorrhage - 38 cases (10%), followed by granuloma or pulmonary abscess - 7 cases (2%) and torsion of a pulmonary lobe in 9 cases (2%).

Pulmonary neoplastic processes were represented by primary neoplastic processes such as pulmonary carcinomas, bronchial carcinomas and adenocarcinomas, diagnosed in 21 cases (5%) and secondary neoplastic processes (pulmonary metastases) diagnosed in 132 cases (34%).

Radiological examination was performed in all cases highlighting inflammatory pulmonary disorders but also primary and secondary neoplastic processes. CT has been used in complex pulmonary diseases such as bronchitis and pneumonia, but also in pulmonary neoplastic processes.

Sample collection techniques (pharyngeal exsudate, ecoguided aspiration puncture, broncho-alveolar lavage) for cytological examination were used for viral, fungal and mycotic inflammatory disease, but also for the type of neoplastic process.

In Chapter IX, reference is made to the usefulness of the diagnostic methods used and correlated with the results obtained. Radiological examination is a sufficient method for congenital abnormalities of the thoracic wall, esophageal and tracheal, in the case of thoracic, pleural and pulmonary post-traumatic disorder, and in the case of neoplastic processes. The ultrasound examination has an increased sensitivity for pleural and mediastinal disorders and for collection of ecoguided samples. CT has been used in complex cases as a complementary method because of its sensitivity in most thoracic disorders. The cytological examination has a high sensitivity for neoplastic and inflammatory processes.

Chapter X is represented by the final conclusions generated from the results obtained in this study and some recommendations regarding the toacic diagnosis of dog and cat.