

ANATOMOPATHOLOGICAL ASPECTS IN HEPATORENAL SYNDROME CONSECUTIVE TO DIROFILARIASIS IN CARNIVORES: CASE STUDY

ASPECTE ANATOMOPATOLOGICE ÎN SINDROMUL HEPATO-RENAL CONSECUTIV DIROFILARIOZEI LA CARNIVORE: STUDIU DE CAZ

Camelia Ramona ION¹⁽²⁾, Florica BĂRBUCEANU¹⁽²⁾,
A. POPOVICI¹⁾, G. BRĂNESCU³⁾, D. DRÎMBU¹⁽²⁾,
Nicoleta Daniela FOLTOS (NEGRILĂ)¹⁽²⁾,
M. CODREANU²⁾

ABSTRACT | REZUMAT

In the field of information explosion at the level of depth and detail, veterinary forensic laboratory expertise has developed rapidly and represents a plus in terms of information and structuring, to diversify and complete the database in the literature, recommending complementary diagnostic methods and techniques to confirm the diagnosis of post-mortem disease. Multiple cases in pets, especially in carnivores, include severe hepato-renal changes, which are influenced by the degree of infestation and the response of the parasite organism. Thus, the proposed case study, aims to expose the major objectives using laboratory diagnostic methods by highlighting hepatorenal anatomopathological changes and exposing the main investigations. The plan of explorations in the evaluation of the case, a cadaver dog, Golden Retriever breed, 3 years old, male, includes the highlighting of hepatorenal morpho-pathological changes consecutive to dirofilariasis, by necropsy method, the highlighting of some cytohistopathological structures by histological method of H.E. staining, the highlighting of parasitic elements *Dilofilaria* spp, by macroscopic and microscopic examination.

Keywords: dog heartworm, hepatorenal syndrome, forensic veterinary laboratory expertise

În domeniul exploziei informaționale la nivel de profunzime și detaliu, expertiza medico-legală veterinară de laborator, a cunoscut o dezvoltare rapidă și reprezintă un plus prin informație și mod de structurare, pentru diversificarea și întregirea bazei de date în literatura de specialitate, recomandând metode și tehnici complementare de diagnostic, menite a confirma diagnosticul bolii post-mortem. Multiplele cazuri întâlnite în rândul animalelor de companie, cu precădere în situația carnivorelor, includ modificări hepato-renale severe, acestea fiind influențate, de gradul de infestare și de răspunsul organismului parazitat. Astfel, studiu de caz propus, urmărește expunerea obiectivelor majore folosind metode de diagnostic de laborator prin evidențierea modificărilor anatomopatologice hepato-renale și expunerea principalelor investigații. Planul de explorări în evaluarea cazului, cadavru câine, rasă Golden Retriever, 3 ani, mascul, cuprinde evidențierea modificărilor morfopatologice hepatorenale consecutive dirofilariozei, prin metoda necropsică, evidențierea unor structuri citohistopatologice prin metoda histologică de colorare H.E., evidențierea elementelor parazitare *Dilofilaria* spp, prin examen macroscopic și microscopic.

Cuvinte cheie: dirofilarioza câinelui, sindrom hepatorenal, expertiză medico-legală veterinară de laborator

Cardiopulmonary dirofilariasis (CPD) is one of the most serious and common diseases, even fatal in the absence of treatment (4). This disease mainly affects carnivores and is caused by the parasite *Dirofilaria immitis* (Nematoda; Filarioides), which is transmitted by mosquito bites, acting as a vector and intermediate host. The infection is widespread worldwide and poses a threat to animals and humans (10).

Parasitic adults are located in the pulmonary arteries and right heart (4). They migrate against the blood flow, from the pulmonary arteries to the right ventricle, right atrium, and vena cava. Due to the inability of the parasites to adhere or sink into the endothelium and move freely, they cause an increase in vascular resistance in the blood circulation at the distal end of the pulmonary arteries, penetrating the heart (8).

Liver failure syndrome, or Caval syndrome (CS), is a consequence of the progression of cardiopulmonary heartworm disease, occurs in the final stage of the disease (stage IV), Adams in 1956, describes an acute form of heartworm associated with a large number of worms in the vena cava and right atrium in a dog. The lesions caused by *D. immitis* are found in the lung, li-

1) Institute of Diagnosis and Animal Health, Bucharest, Romania

2) University of Agronomic Sciences and Veterinary Medicine, Faculty of Veterinary Medicine, Bucharest, Romania

3) Transilvania University of Braşov, Faculty of Food and Tourism, Braşov, Romania

*) Corresponding author: florica.barbuceanu@idah.ro

ver, cardiovascular system, and kidney and are represented by thrombosis of the myocardial collagen matrix, degenerative liver lesions, and changes in kidney structure (7, 8, 9, 13).

MATERIALS AND METHODS

The purpose of the case study is to illustrate the primary objectives of using laboratory diagnostic methods by focusing on hepatorenal anatomopathological changes. It aims to highlight these changes and discuss the main investigations involved in diagnosing and understanding the underlying pathology.

The study included a cadaver dog, Golden Retriever breed, male, large size, about 3 years old, micro-chipped, weight about 30 kg, straw-yellow coat (specific to Golden Retriever breed), unsterilized, and vaccinated. According to the owner's statement, the animal died as a result of poisoning. To determine the cause of death of the animal, a veterinary forensic laboratory examination was carried out, which involved a number of laboratory tests, namely an anatomopathological examination, a histopathological examination, a bacteriological examination, a parasitological examination, and a toxicological examination.

The anatomopathological examination was carried out in the necropsy room, which is part of the Morphopathology Service of the Institute of Diagnosis and Animal Health, by applying the method "Evidence of anatomopathological changes in animals by necropsy method" (1, 2, 4, 5).

Histopathological examination consisted of tissue fragments sampling, 10% formalin fixation, phasing, pre-embedding, paraffin embedding, then microtomy of paraffin cubes at 5µm size, and finally application of routine histological staining "Evidence of cyto-histopathological changes by histological Hematoxylin-Eosin (HE) staining method" and "Evidence of cyto-histopathological changes by histological Hematoxylin-Eosin-Methyl Blue (HE) staining method" (1, 3).

The parasitological examination consisted of the application of the direct parasitological method "Method for the detection of parasitic forms of *Dirofilaria spp.* (6, 9). The bacteriological examination was carried out using the method "Isolation and identification of pathogens" (1).

RESULTS AND DISCUSSIONS

Pathological examination showed generalised circulatory lesions, expressed by congestion and haemorrhages, more severely expressed in the brain, heart, lungs, liver, and kidneys, accompanied by hemothorax and hemoperitoneum, and in the cardiac cavities, the presence of non-coagulated and dark blood (11, 12). Mildly jaundiced appearance of the meninges and spi-

nal cord; jaundiced eyeballs, conjunctival mucosa jaundiced, congested; tongue, tonsils, pharynx, larynx, jaundiced appearance. Thyroid and parathyroid: jaundiced; trachea: mildly congested and jaundiced, mucous catarrh; oesophagus: jaundiced; mild congestion.

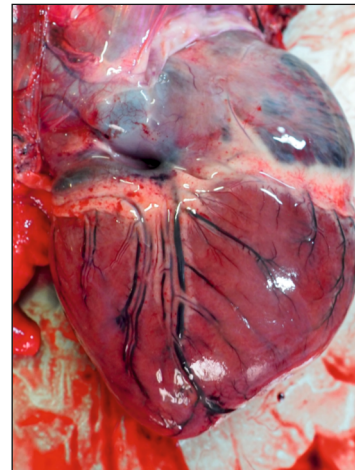


Fig. 1. Dog, 3-year-old male Golden Retriever: Macroscopic: Cardiac dilatation with the presence of multiple red infarcts along the right and left coronary arteries and at the level of the transverse groove; hypertrophy of the right heart; small subepicardial haemorrhages infiltrating the adipose tissue at the level of the transverse groove



Fig. 2. Dog, 3 years old, male, Golden Retriever: Macroscopically: Presence of a cluster of adult nematodes in the right ventricle, 12 to 30 cm long, white in colour (adult forms of *Dirofilaria spp.*); uncoagulated blood in the cardiac cavities

Presence of sero-haemorrhagic effusions in the chest cavity in the amount of about 100 ml. In the heart, there was hemopericardium, right heart dilatation, the presence of multiple red infarcts in the right and left coronary arteries and in the transverse groove of the heart, an area where small subepicardial haemorrhages infil-

trating the adipose tissue of the transverse groove can be observed; parasitic infection in the right heart, with the presence of a white, approximately 12 and 30 cm long, parasitic ball (adult *Dirofilaria*); pericardial fluid with a sero-haemorrhagic appearance (Fig. 1 and 2). congested trachea and bronchi; white adult nematodes, 12 to 30 cm long (adult *Dirofilaria*), are present in the pulmonary artery (Fig. 3 and 4) enlarged tracheo-bronchial and mediastinal lymph nodes, hyperaemic. In the lung areas of vicarious emphysema in the pulmonary apical lobes; congestion and pulmonary oedema.

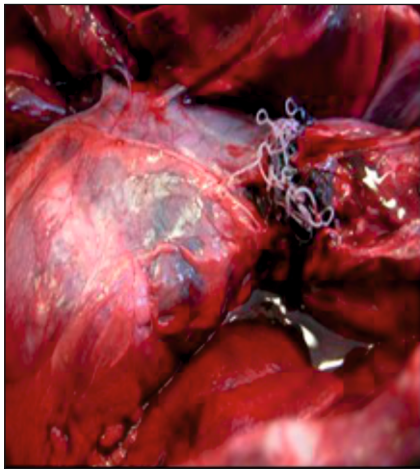


Fig. 3. Dog, 3 years old, male, Golden Retriever: Macroscopically: Adult forms of *Dirofilaria* in lobar branches of pulmonary arteries and in bronchi

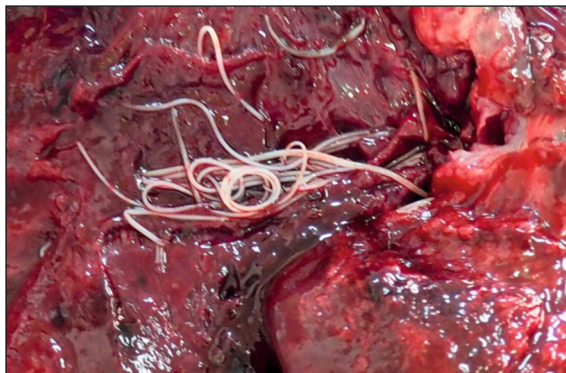


Fig. 4. Dog, 3 years old, male, Golden Retriever: Macroscopic: *Dirofilaria* in lung parenchyma, bronchiolar level; pulmonary oedema and congestion

The abdominal cavity showed jaundiced staining of the omentum, accompanied by haemorrhagic infiltration. Stomach without food content, with thickened, oedematous, congested gastric wall and oedematous mucosa, with punctiform haemorrhages and presence of a haemorrhagic exudate; mesenteric lymph nodes: haemorrhagic, on a jaundiced background.

Passive hepatic congestion on a background of degeneration; liver slightly enlarged in volume, of slight-

ly increased consistency, turgid, on sectioning dark blood drained. (Fig. 5).

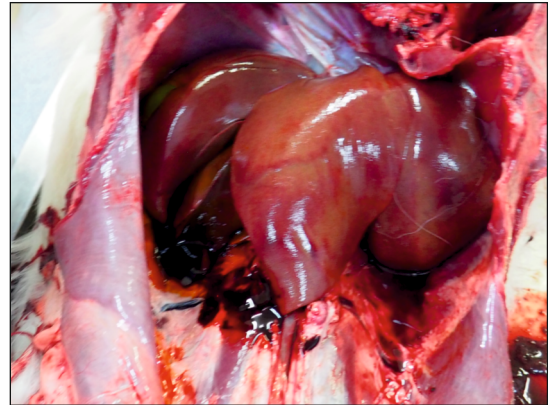


Fig. 5. Dog, 3 years old, male, Golden Retriever: Macroscopically: passive hepatic congestion on background of degeneration; liver slightly enlarged in volume, of slightly increased consistency, turgid, on sectioning, dark blood

Pronounced haemorrhage at renal cortico-medullary border, haemorrhage in the pelvis, with blackish blood, slightly jaundiced appearance of renal cortex and medullary congestion. (Fig. 6).



Fig. 6. Dog, 3 years old, male, Golden Retriever: Macroscopically: pronounced haemorrhage at renal cortico-medullary border; haemorrhage in pelvis with blackish blood; slightly jaundiced appearance of renal cortex; medullary congestion

Direct parasitological examination revealed the presence of adult *Dirofilaria immitis* (Fig. 7). Histopathologically, the liver tissue showed degeneration on a haemorrhagic background and the presence of a fragment of an adult parasite of *Dirofilaria spp.* (Fig. 8).

CONCLUSIONS

The lesions observed were caused by circulatory disorders produced by severe cardiac and vascular para-

sitism and by the toxic action of the parasites. After correlating the results of the pathological examination with the laboratory investigations, it was found that the death of the animal was caused by toxico-septicemic shock and decompensated hypovolaemia, as a consequence of systemic bacterial infection with beta-haemolytic *Escherichia coli*, an infection to which were associated irreversible changes produced by the parasitic and cardio-circulatory infections with *Dirofilaria immitis*

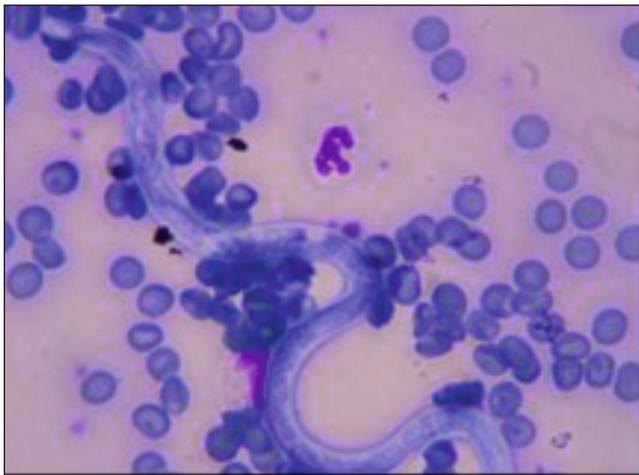


Fig. 7. Dog, 3-year-old male Golden Retriever: Microscopic: Parasitological examination - direct method: adult *Dirofilaria immitis*

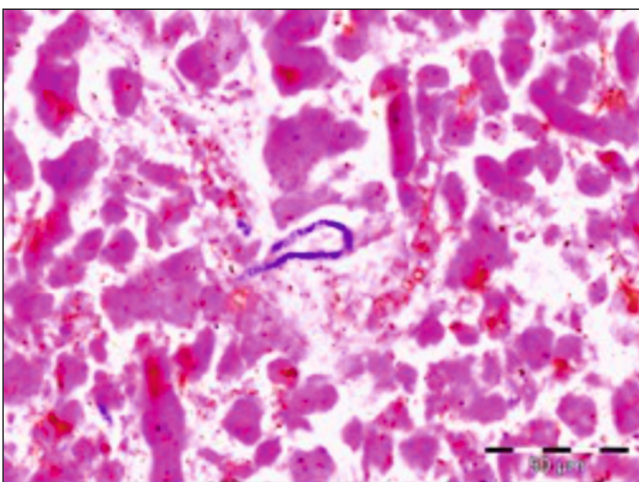


Fig. 8. Dog, 3 years old, male, Golden Retriever: cytopathological examination of liver tissue, met. HE: degeneration on haemorrhagic background and presence of a fragment of an adult parasite of *Dirofilaria spp.*

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