CARDIAC LESIONS IN CANINE BABESIOSIS

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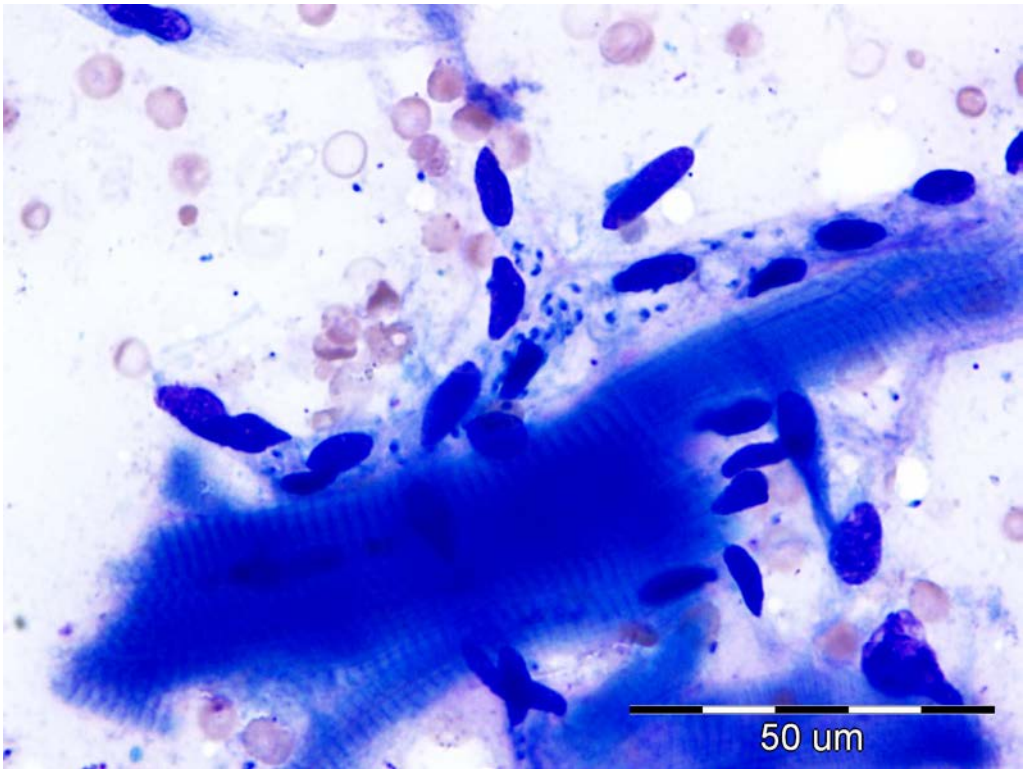
Introduction: Babesiosis, caused by several *Babesia* species, is one of the commonest infectious diseases of dog populations in Croatia. This intraerythrocytic 2,4-3 x 4-5 µm teardrop shaped protozoan parasite causing malaria-like disease in dogs is well-known amongst veterinary practitioners for more than 50 years. Prevalence of *Babesia canis* in continental Croatia is connected with specific tick vector *Dermacentor reticulatus* distribution. After transmission, piriform merozoites are multiplied within erythrocytes causing febrile haemolytic disease. Uncomplicated babesiosis is characterized with mild to moderate haemolytic crisis dependent on parasitemia levels and erythrocytes destruction degree, although some dogs may be asymptomatic. Symptoms of complicated babesiosis except hypoxic and toxic (haemoglobin, bilirubin, and myoglobin) lesions are related to multiple organs dysfunction syndrome development due to overwhelming systemic inflammatory reaction. Paucity information is available about impact of *Babesia rossi* on the canine myocardium. *Babesia rossi* is so far considerated as the most pathogenic subspecies of *Babesia* known to cause cardiac babesiosis in infected dogs form endemic regions of the South Africa. Myocardial lesion descriptions, both clinical and pathological in *Babesia canis* infection are entirely lacking.
In order to clarify impact of *Babesia canis* on canine heart, we classified cardiac lesions based on the tissue destruction pattern in 20 dogs. These dogs died or were euthanized due to complicated disease, *Babesia canis* infection was confirmed by PCR and sequencing.

Materials and Methods: Necropsy and histological findings from 7 female and 13 male dogs of different breeds and age, ranging from one month to 12 years were classified based on presence of following macroscopic and microscopic cardiac lesions. Lesions found at necropsy included pericardial effusion, epicardial, endocardial and myocardial haemorrhages and necrosis. Microscopic lesions were identified as presence of endomisial oedema, focal necroses of cardiomyocytes, haemorrhages, sludging of parasitized erythrocytes, extracellular piroplasms presence, intravascular leukocytostasis, micro-thrombi, dystrophic mineralisation and myocarditis.

Results: Pericardial effusion were found in 6/20 cases; 2/6 followed focally extensive infarctions, 4/6 in connection with vascular permeability disturbances connected with epicardial haemorrhages. In 12/20 cases epicardial, endocardial and/or myocardial haemorrhages were found. Histologically, most frequent findings were endomisial oedema (16/20 cases), haemorrhages (13/20 cases) and intravascular leukocytostasis (12/20 cases). Free extracellular piroplasms were present in 7/16 cases with microscopically visible parasite erythrocytes. Sludging of parasitized erythrocytes within myocardial capillaries was found to

be possible cause of myocardial haemorrhages in 4/20 dogs; all of these dogs had pronounced endomisial oedema. Focal necroses were found in 6/20 cases, while extensive neutrophilic and histiocytic myocarditis was found in 4/20 cases as respond to focally extensive myocardial necrosis following thrombosis.

Discussion: All dogs in this study found to have myocardial lesions. Most prominent lesions with massive myocardial necrosis are connected with coagulopathy, previously described as a possible complication in *Babesia canis* infection. All other lesions found are of hypoxia origin, connected with pavementing of parasitised erythrocytes against the endothelium (sludging) or due to plasma dilution and endomisial oedema accumulation as described in cases of infection with *Babesia rossi*. Our findings suggested that *Babesia canis* seems to be equally pathogenic as *Babesia rossi*. Cardiac lesions in clinical cases have to be expected and recognised in cases of complicated babesiosis in Croatian dogs. *Babesia canis* and *Babesia rossi* are species specific and infectious only for canines, opposed to *Babesia divergnes* and *Babesia microti* confirmed as zoonotic strains of bovine and rodent babesiosis. Human babesiosis is characterised as well as a febrile illness similar to malaria
First human case of babesiosis in the world was diagnosed in Croatia (1957) and since then no cases were recorded. One of possible reason, except low prevalence, is use of automated cell readers in hospitals that cannot detect merozoites in erythrocytes and non-specific clinical signs.



Postmortal myocardial scrapings of cardiomyocytes and capillary's fragments, Giemsa X100. Severe endothelium pavement with erythrocytes containing merozoites of *Babesia canis*.