

Study on Association between *E. canis* Infection and its Potential Cardiac Effect.

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Received: November 15, 2021; **Published:** November 30, 2021

Abstract

This study was conducted on *E. canis* positive dogs to know the alteration in cardiac rhythm or other functional disorder arises due to infection. It was observed that the dogs after recovery from *E.canis* infection they were showing an extra, low-amplitude, positive deflection preceding the P-wave that occurred frequently and consistently over several consecutive cardiac cycles, although its morphology and time interval relative to the following P wave was not constant. Post recovery exercise intolerance might be due to *E.canis*. Further study needs to be carried out to know the exact reason.

Introduction

Canine monocytic ehrlichiosis (CME) is a common worldwide tick borne disease caused by *Ehrlichia canis*. The principal vector of the rickettsia is the brown dog-tick *Rhipicephalus sanguineus*. After an incubation period of 8-20 days, signs of clinical disease appear characterized by fever, anorexia, weight loss, depression, lymphadenomegaly and splenomegaly.

Dogs may present bleeding tendencies, mainly petechiae and ecchymoses of the skin and mucous membranes [1]. After 1 to 4 weeks with no medical treatment (or after inadequate treatment) dogs may recover the acute disease and may enter the subclinical phase of CME [2]. Dogs in this stage may remain persistent carriers of the rickettsia for months and years. Some dogs may subsequently develop the chronic pancytopenic form of the disease [3]. Thrombocytopenia is the most common and consistent hematologic finding in all phases of CME. Mild leukopenia and mild anemia (usually non-regenerative normocytic normochromic) may occur in the acute stage of CME. The disease is a multi-systemic with clinical symptoms reflected mainly due to changes in the hematopoietic system. Besides the fever and hematological changes seen as a result of infection with *E. canis*, changes in liver enzymes indicative of liver involvement are commonly observed [4]. There is a dearth of clinical reports of the effects of CME on specific organs, although ocular pathology is commonly reported [5-7]. It has been observed that the dogs which are infected with *E.canis* when treated with standard drug recommended for the treatment of Ehrlichia responds normally and dogs get cured as expected. But there is very long convalescence period after clinical recovery. When the dogs forced to do work during the convalescence period some of them showing exercise intolerance and few of them collapsed suddenly. The reason behind exercise intolerance and sudden collapse is assumed to be cardiac disorder. So, this study has been undertaken to find out if there is any correlation between *E.canis* infection and cardiac disorder.

Material and methods

A total number of ten clinically positive cases of *E.canis* were taken for study. The dogs were diagnosed with blood smear examination and PCR. A full physical examination with a complete blood count (CBC) and blood chemistry examination were carried out. During convalescence stage the dogs were put for ECG investigation to know the alteration in cardiac rhythm or electrical alteration.

Result and discussion

Auscultation of the lungs revealed fine crackles and a strong cough reflex which was readily elicited by tracheal palpation. Normal heart sounds were auscultated and no audible murmur was present. All the cases were treated with standard therapeutic regimen and recovered normally. During convalescence stage the dogs were put for ECG investigation to know the alteration in cardiac rhythm or electrical alteration. The hematological and biochemical and ECG parameters are shown in the table-1, 2 and 3 respectively. The ECG was examined for lead II, Heart rate and rhythm were normal (sinus rhythm with an R-to-R interval of 610 ± 10 milliseconds, which translates to a heart rate of 95 ± 2 bpm). Measurable amplitudes and intervals were all within reference range, as follows: PR=105 milliseconds, QRS=55 milliseconds, QT=188 milliseconds, R=0.6 millivolts). The only suspected abnormal finding was an extra, low-amplitude, positive deflection preceding the P-wave that occurred frequently and consistently over several consecutive cardiac cycles, although its morphology and time interval relative to the following P wave was not constant. The differential diagnosis list included an artifactual recording, atrial parasystole, or atrial dissociation. Of these differential diagnoses atrial parasystole seemed to be the most relevant choice. The ECG appeared to show evidence of two independent atrial rhythms, one of which triggered a QRS complex while the other did not. Each of these two rhythms appeared to have its own "internal" P-to-P interval, and they did not interfere with each other. Although the ECG findings are compatible with either pace making or conduction aberrancies the exact nature of organic or structural changes is not known. Of the three differential diagnoses, artifactual recording, atrial parasystole, or atrial dissociation, atrial parasystole seemed to be the most applicable choice. The origin of this independent pacemaker appeared to be atrial as there was no inscription of a repolarization event, which would have been expected to follow ventricular depolarization. There appears to be two independent atrial pacemaker sites remote from each other, one at the SA node that "fired" normally and the other elsewhere in one of the atria. The possibility that this finding was artifact must also be considered [8]. Although this is a possibility, its likelihood is considered low: the association of the additional P-wave during the pinnacle of the disease and its disappearance after treatment with resolution of the clinical signs may add some credibility to ECG recordings, both at the time of the disease and at recovery. The diagnosis of atrial dissociation has also been rejected due to its being very rare and typical of advanced heart disease (unlike the presently reported patient) and due to the fact that, as opposed to the trace in the presently reported patient, its P-like wave is typically smaller than the one resulting from sinus rhythm [8, 9].

Conclusion

From this study it is concluded that the *E. canis* infected dogs are usually recovered well after treatment with standard therapeutic regimen. But during convalescence period most of them got exercise intolerance when put for exercise or their normal work. During convalescence stage the dogs were put for ECG investigation to know the alteration in cardiac rhythm or electrical alteration. The only suspected abnormal finding was an extra, low-amplitude, positive deflection preceding the P-wave that occurred frequently and consistently over several consecutive cardiac cycles, although its morphology and time interval relative to the following P wave was not constant. The differential diagnosis list included an artifactual recording, atrial parasystole, or atrial dissociation. Of these differential diagnoses atrial parasystole seemed to be the most relevant choice [10].

<i>Parameter</i>	<i>Hb</i>	<i>TEC</i>	<i>TLC</i>	<i>N</i>	<i>L</i>	<i>E</i>	<i>B</i>	<i>PCV</i>	<i>Platelets</i>
Units	Gm%	million	1000	%	%	%	%	%	lac
Mean value	9.25	3.77	22.1	73	24	2.37	0.63	24.7	0.98

Table 1: showing means hematological parameters of clinical cases of *E.canis*.

<i>Parameters</i>	<i>ALT</i>	<i>AST</i>	<i>BUN</i>	<i>Creatinin</i>
Unit	IU/dl	IU/dl	IU/dl	IU/dl
Mean values	88.4	56.1	35.45	1.05

Table 2: showing mean biochemical parameters of clinical cases of *E.canis*.

<i>ECG parameters</i>	<i>RR interval</i>	<i>PR interval</i>	<i>QRS duration</i>	<i>QT duration</i>	<i>R amplitude</i>	<i>Heart beat</i>
Units	mili seconds	mili seconds	mili seconds	mili seconds	mili volts	Per minute
Mean value	610	105	55	188	0.6	95

Table 3: showing mean ECG parameters of recovered cases of *E.canis*.

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Volume 1 Issue 4 December 2021

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