Diagnosis and Clinical Management of Canine Monocytic Ehrlichiosis in a Non-descriptive Breed of Dog – A Case Report

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Diagnosis and Clinical Management of Canine Monocytic Ehrlichiosis in a Non-descriptive Breed of Dog – A Case Report

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Abbreviations	Elaborations
UVH	University Veterinary Hospital
mg/kg	Milligram per kg
IV	Intravenous
PO	Per Oral
IM	Intra-muscular
SQ	Sub-cutaneous
SID	Single in Day
BID	Bis in die (Use twice a day)
BW	Body Weight
bpm	Beats per minute
PCT	Procalcitonin
ICU	Intensive Care Unit

ABSTRACT

Canine monocytic ehrlichiosis (CME) is one of the most common tick borne disease among dog population in Selangor, Malaysia as well as tropical, sub-tropical region in Asia and is caused by *Ehrlichia canis*. The present study was conducted at the University Veterinary Hospital, Faculty of Veterinary Medicine, University of Putra Malaysia,Selangor, Malaysia. The study was carried out on dog was presented to UVH, Selangor, Malaysia, for treatment with a history of anorexia, fever, tick infestation, weakness, anemia, scanty feces, bloody urine, swollen of prefemoral, prescapular , submandibular and popliteal lymphnodes ,shrunken eye ball with reddish pupil and reluctant to walk. Blood samples were collected to analyze hematological parameters where anemia, thrombocytopenia and low PCV (10%) were found. Confirmative diagnosis was done by peripheral blood smear examination for presence of intracytoplasmic morula of (*E.Canis*) within monocytes. On the day of hospitalization the dog was treated with Enrofloxacin @ 5 mg/kg IV, SID for 10 days with intravenous 0.9% NaCl saline (250 ml/day), Ranitidine@ 2 mg/kg IV BID for 5 days, Vitamin K @2.5mg/kg SQ in multiple sites BID for 5 days, Doxycycline tablet @ 10 mg /kg, PO after food SID for 10 days , Meloxicam @2.5mg/kg BW IM SID and 450 ml whole blood transfusion also performed at 3rd day of hospitalization. The infected dogs showed remarkable improvement in hemorrhagic tendency after whole blood transfusion and complete recovery after 10 days of therapy with doxycycline and enrofloxacin.

Keywords: Canine monocytic ehrlichiosis, *Ehrlichia canis*, Doxycycline, Enrofloxacin, Blood transfusion

Chapter 1

INTRODUCTION

Ehrlichiosis in canines also known as canine rickettsiosis, canine hemorrhagic fever, canine typhus, tracker dog disease, and tropical canine pancytopenia, is caused by rickettsial microorganism *Ehrlichia canis*, which is small pleomorphic gram negative coccoid bacteria belonging to family Ehrlichiaceae. The brown dog tick, *Rhipicephalus sanguineus* is the main vector which harbours Ehrlichia organism and transmits it to dogs (Melo *et al*., 2011**;** Mylonakis *et al*., 2004**;** Davoust *et al*., 2005)**.** *Ehrlichia canis* is distributed worldwide in dog population and wild canids (Harrus *et al.,* 1996; Dagnone *et al*., 2003**).** This microorganism enters the blood circulation by bite of brown dog ticks and parasitizes the monocytes and multiply intracellularly forming a mulberry-like structure called morula which is diagnostic feature for canine ehrlichiosis. Ehrlichiosis is a multisystemic disorder which may produce hemorrhage tendency, lymphadenopahty, splenomegaly, hepatomegaly, along with cardiac/renal disorders and myelosupression (Aysul *et al.,* 2012). The disease was first described in 1935 in Algeria, as a febrile sickness associated with leukopenia, thrombocytopenia, depression and anemia in several dogs (Donatien *et al*., 1935). Some closely related pathogens, including *Ehrlichia ewingii*, *Ehrlichia chaffeensis*, *Anaplasma phagocytophilum* and *Neorickettsia risticii*, are shown to cause similar clinical and hematological manifestations in dogs as well (Dumler *et al*., 2001; Dawson *et al*., 1991). However, *E. canis* is responsible for the most common and clinically severe form of canine ehrlichiosis, and may also be a cause of human ehrlichiosis (Perez *et al*., 1996, 2006). Canine monocytic ehrlichiosis mainly seen in three forms. Acute form followed by subclinical and chronic forms. Disease is mainly characterized by fever, anorexia, weakness, epistaxis, lymphadenopathy, tick infestation, and ocular changes (Hernandez *et al*., 2012). In *E. canis* infections the significant hemopathological findings were determined in dogs with acute (thrombocytosis), subclinical and chronic (anemia, thrombocytopenia, leukopenia) (Waner *et al*., 1999). The aim of the present case study was to present the Canine monocytic ehrlichiosis (CME) and it's diagnosis , clinical management also discuss the results with already known veterinary literature.

Chapter 2

CASE HISTORY, CLINICAL OBSERVATIONS AND DIAGNOSIS

An eight years old, female, local non descriptive dog (13.6 kg BW) was presented at the University Veterinary Hospital, Faculty of Veterinary Medicine, University of Putra Malaysia, Selangor, Malaysia. It was having history of anorexia, fever, tick infestation, weakness, anemia, scanty feces, bloody urine, swollen of prefemoral, prescapular, submandibular and popliteal lymphnodes, shrunken eye ball with reddish pupil and reluctant to walk which might be due to pain in the joints. Clinical examination of the dog revealed rise in body temperature (104.8ºF), tachyponea (48/min), tachycardia (146bpm) (**Table 1**), several cutaneous echymoses **(Figure 01**) and dullness. On physical inspection capillary refill time (CRT) increased to 3 seconds, conjunctival mucous membrane was pale**,** second degree of dehydration and on palpation splenomegaly and partial hepatomegaly observed which was similar to Parmar *et al*., 2013. Blood was collected and subjected to routine haematology and biochemistry. Peripheral blood and whole blood with EDTA was collected for laboratory examination. Peripheral blood smear was made from the animal and subjected to direct microscopic examination using Giemsa stain for hemoprotozoan parasite investigation. Diagnosis was based on presence of intracytoplasmic morulae in monocyte on peripheral blood smear examination which confirmed the presence of ehrlichia infection **(Figure 03).**

Hematology revealed Anaemia (Hb-2.70 g/dl), RBC'S (1.27×10^{12}/ L), Packed Cell Volume (10%), Plasma Protein (50 g/L) Thrombocytopenia (Platelet count- 3 thousand/mm^3), Neutrophil (24.92×10^9/L), Lymphocytes (6.47×10^9/L), Monocytes (5.64×10^9/L) and PCT (0.00%) (**Table 2**)

Thus on the basis of laboratory and clinical examination ehrlichiosis was confirmed. Similar findings were also observed by Waner *et al*., 1999.

Table 1: Vital parameters pre and post- treatment in dog suffering from Ehrlichiosis

Parameters	Pre-treatment	Post-treatment
Temperature (ºF)	104.8	101.6
Respiration rate (/min)	48	28
Heart rate (bpm)	146	90

Table 2. Values of the hematological parameters of the dog infected by Ehrlichiosis

Parameters	Pre-treatment	Reference value	Post-treatment
Hemoglobin (g/dl)	2.7	12.0 – 18.0	13.9
RBC (10^{12}/L)	1.27	5.65 – 8.87	5.8
PCV (%)	10	37 - 57	39
Plasma Protein (g/L)	50	57 - 71	62
Thrombocyte (thou/mm^3)	3	160 - 510	178
Neutrophil (10^9/L)	24.92	3.0-12.5	10.56
Lymphocytes (10^9/L)	6.47	1.0-4.0	2.4
Monocytes (10^9/L)	5.64	0.16- 1.12	0.85
PCT (%)	0.00	0.14 – 0.46	0.23

FIGURES

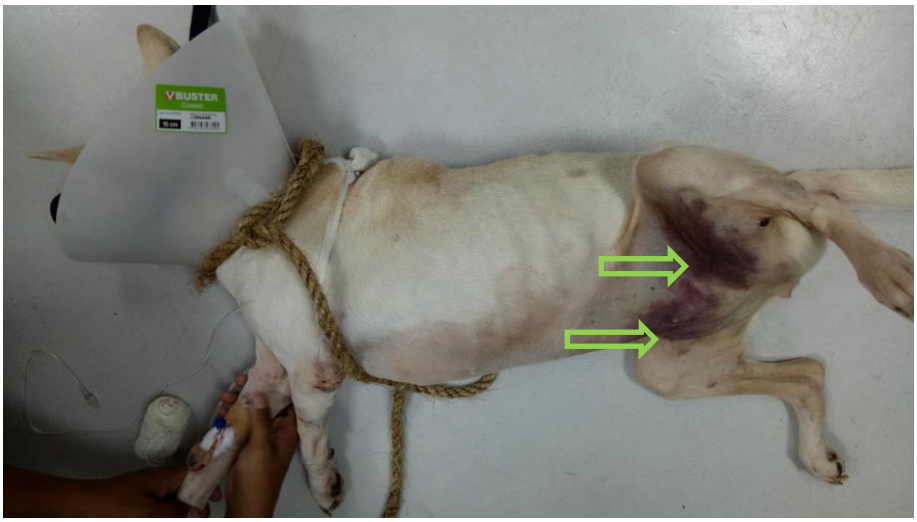

Figure 01: The infected dog with of several cutaneous echymoses (arrow).

Figure 02: Whole blood transfusion to Canine Monocytic Ehrlichiosis affected dog.

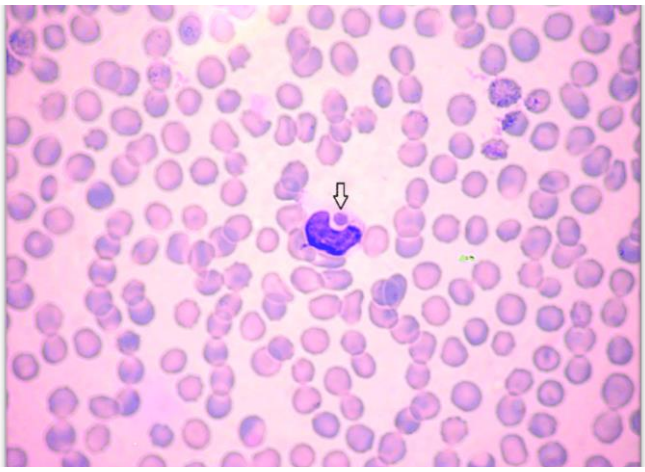

Figure 03: Showing the presence of intracytoplasmic morula of *Ehrlichia canis* (arrow) in monocyte (Giemsa, 100x)

Chapter 3

RESULTS AND TREATMENTS

Based on clinical signs, hematological and biochemical reports the case was suspected for hemaprotozoan infection and blood smear confirmed it as *E. canis* infection because the presence of intracytoplasmic morulae in monocytes in peripheral blood smear. On the day of presentation to University Veterinary Hospital the dog was placed into small animal ICU unit for close monitoring and treated with Enrofloxacin (Baytril from Bayer Animal Health Ltd., Malaysia) @ 5 mg/kg IV, SID for 10 days along with intravenous 0.9% NaCl saline (250 ml/day where 50 ml /hour), Ranitidine@ 2 mg/kg IV BID for 5 days as a H2 Blocker , Vitamin K @2.5mg/kg SQ in multiple sites BID for 5 days as blood coagulation factor , Doxycycline tablet @ 10 mg /kg, PO after food, SID for 10 days, Meloxicam @2.5mg/kg BW IM SID as a antipyretic drug. Due to severe anemia and low PCV (10%), total 450 ml blood transfusion (108.8 ml / hour) was performed for this dog on 3rd day of hospitalization (**Figure 2**). The blood was collected from a 27.8 kg weighted shelter donor male dog and its PCV, Plasma Protien was 47% and 84.9 g/L respectively. On day 10 of the treatment, vital parameters were normal (**Table 2**), parasitemia was reduced significantly with clinical and hematological improvement. After 10 days of treatment dog recovered successfully.

Chapter 4

DISCUSSION

Treatment of *Ehrlichia canis* infections is considered to be successful when dogs recover clinically, the hematology and biochemistry values return to normal and the organism can no longer be shown to be present in the body. There are numerous anecdotal reports of the efficacy of antimicrobials in the treatment of *E. canis* infections. Drugs reported to be effective against *E. canis* include doxycycline (Brouqui *et al*., 1990; Kontos *et al*., 1998), short and long-acting oxytetracycline (Brouqui *et al*., 1990, 1991), imidocarb dipropionate (Adenyanju *et al*., 1982), enrofloxacin (Neer *et al*., 1999; Brietschwerdt *et al*., 1991; Kontos *et al*., 1998).

Antibiotics reported to be ineffective against *E. canis* include penicillin G (Breitschwerdt *et al*., 1987), erythromycin (Brouqui *et al*., 1991) and chloramphenicol (Bartsch *et al*., 1996; Brietschwerdt *et al*., 1991). In general, the significance of these reports is difficult to interpret, as in many cases they were based only on clinical improvement of dogs following treatment, and in some cases the disappearance of *E. canis* morulae from blood smears. These changes also occur, however, in dogs that remain infected and progress from the acute to the subclinical phase of the disease. There are now a number of more controlled studies on the efficacy of enrofloxacin in the treatment of experimentally and naturally-acquired *E. canis* infections .

In this study we used as same dose of enrofloxacin which is suggested by Kontos and Athanasiou.,(1998) and therapeutic dose of doxycycline was similar with Barman *et al*., 2014; Kottadamane *et al*., 2016**;** Harrus *et al*., 2004. The efficacy of enrofloxacin against *E. canis* is supported by the results of *in vitro* studies, where doxycycline was found to have a rickettsiocidal effect on the organism **(**Kontos et al., 1998). Our findings were concurrent with Dushyant et al., 2015 who reported that whole blood transfusion improves the erythrocyte count, PCV and platelets and reduction in monocyte and neutrophils was recorded after few days of therapy which can be explained by antimicrobial doxycycline clearing up the infection of *E. canis*. Harrus *et al*., 2004 reported that most dogs recover from acute and subclinical

disease when treated with appropriate and adequate dosages of doxycycline or other tetracyclines which are the first line of drugs for ehrlichiosis.

The dogs recovered completely and found to be negative for ehrlichiosis 10 days post therapy by blood smear examination and also hematol-biochemical parameters were in the normal range of species.

CONCLUSION

The animals showed substantial improvement in condition after 2-3 days, started taking food. Doxycycline is the drug of choice for canine ehrlichiosis where enrofloxacin combination will enhance the recovery and whole blood transfusion can be adopted as a supportive therapy for severely anemic and thrombocytopenic cases. The clinical recovery can be observed within 2-3 day of therapy and regimen needs to be continued for 10-15 days for clearing up parasitemia.

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BIOGRAPHY

I am Md. Moktadir Billah Reza from Naogaon, Bangladesh. I have completed my Secondary School Certificate (SSC) examination in 2010 with GPA-5 from K.D Govt. High School, Naogaon Sadar, Naogaon and Higher Secondary Certificate (HSC) examination in 2012 with GPA 5.00 from Bogra Cantonment Public School & Collage, Bogra. Currently I have been doing my internship programme which is the compulsory of DVM programme under the Faculty of Veterinary Medicine, Chittagong Veterinary and Animal Sciences University. I have finished my clinical training at Tamil Nadu Veterinary & Animal Sciences University, India and University of Putra Malaysia, Malaysia for one month at each university. My favorite hobby is making people happy. My research interest is molecular epidemiology of zoonotic diseases and one health. I feel much interest in exploring & spreading new techniques for contributing in development of veterinary field in Bangladesh.