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Therapeutic Management of Canine Ehrlichiosis: Lesson Learned from Bareilly, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Case Study

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ABSTRACT

The study was conducted on 5 dogs presented at Teaching Veterinary Clinical Complex, Indian Veterinary Research Institute with history of anorexia, lethargy, weakness, high fever, vomiting, severe panting and heavy tick infestation. Physical examination of dogs revealed increased respiratory rate, pale mucus membrane and conjunctiva, dehydration and enlarged lymph nodes. Haematological finding showed marked anaemia and thrombocytopenia. Sonographic and radiographic investigation of the abdomen revealed splenomegaly and partial hepatomegaly. Parasitological examination found it positive for *Ehrlichia canis* and confirmed the ticks *Rhipicephalus sanguineus*. Dog was treated with doxycycline @ 10 mg/kg for 28 days in divided dose with supportive therapy. Dog showed marked recovery after 2 dose of doxycycline and re-examination of blood after 20 days gave negative results in rapid test kit.

Keywords: Ehrlichia canis; anaemia; splenomegaly; Rhipicephalus sanguineus; thrombocytopenia doxycycline.

1. INTRODUCTION

"Ehrlichiosis is a highly fatal tick-borne emerging disease of humans and animals caused by *Ehrlichia canis* (order Rickettsiales, family *Anaplasmataceae*). It is a gram-negative, obligate intracellular bacteria infecting predominantly mononuclear leukocytes cells of canines. Its distribution depends upon the epidemiology of principal vector, *Rhipicephalus sanguineus* (brown dog tick) which transtadially and intrastadially transmitting disease to its canine host. Life cycle consists of three intracellular phase, *viz*. initial bodies, morulae (aggregate of initial bodies) and elementary body. *Ehrlichia* spp manage to survive within the ticks by invading and replicating in the endothelial cells, white blood cells, midgut cells, and salivary glands of the ticks. It was first recognized in Algeria as a distinct clinical entity by Donatien and Lestoquard in the year 1935" [1]. Later, during the Vietnam War, many military working dogs brought to Vietnam by the US army exhibited a severe disease called Tropical Canine Pancytopenia. There onwards, it was renamed as tropical pancytopenia or canine monocytic ehrlichiosis (CME). Since then, it has been reported worldwide, causing extensive morbidity and mortality among domestic dogs and other canids.

Ehrlichiosis is highly prevalent in tropical and subtropical areas including India where dog, red fox, coyote and golden jackal are acting as important reservoir host. Disease distribution showed seasonal variation with greater incidence rate in warmer seasons. In general, all dog breeds are equally susceptible to Ehrlichiosis, however German shepherds and Siberian Huskies have a worse prognosis because they develop a more severe form of the disease due to a lower cell-mediated immune response to *E. Canis*. "Following an incubation period of one to three weeks, three typical phases of the disease may develop sequentially: acute, subclinical, and chronic. Common clinical signs of Ehrlichiosis include fever, lethargy, lameness, oculonasal discharge, epistaxis, petechiae, ecchymoses, prolonged bleeding during estrus, hematuria or melena associated with thrombocytopenia, thrombocytopathy or vasculitis, non-regenerative anemia, leukopenia, hyperglobulinemia and proteinuria during various stages of infection. Ocular signs are also common in CME including anterior uveitis, corneal opacity, hyphema, retinal vessel tortuosity, chorioretinal lesions, subretinal hemorrhage, retinal detachment, or blindness" [2]. *Ehrilichia* is common in this region (Izatnagar, Bareilly) but it remains undiagnosed because of lack of awareness amongst pet owners. The objective of this study was to provide general outline of the condition of dog from the stage of infection to treatment response and recovery phase in dog.

2. CASE HISTORY

The case study was conducted on 5 dogs (age varying from 3 months to 16 years) during the tick season, between June and September which were presented at the Teaching Veterinary Clinical Complex, Indian Veterinary Research Institute, Izatnagar, Bareilly. They were having history of anorexia since many days, lethargy, weakness, high fever, vomiting, severe panting, scanty feces, staggering gait and heavy tick infestation. Physical examination of dogs revealed increased respiratory rate, pale mucus membrane and conjunctiva, dehydration, shrunken eye ball and enlarged lymph nodes. Sonographic and radiographic investigation of the abdomen revealed splenomegaly and partial hepatomegaly.

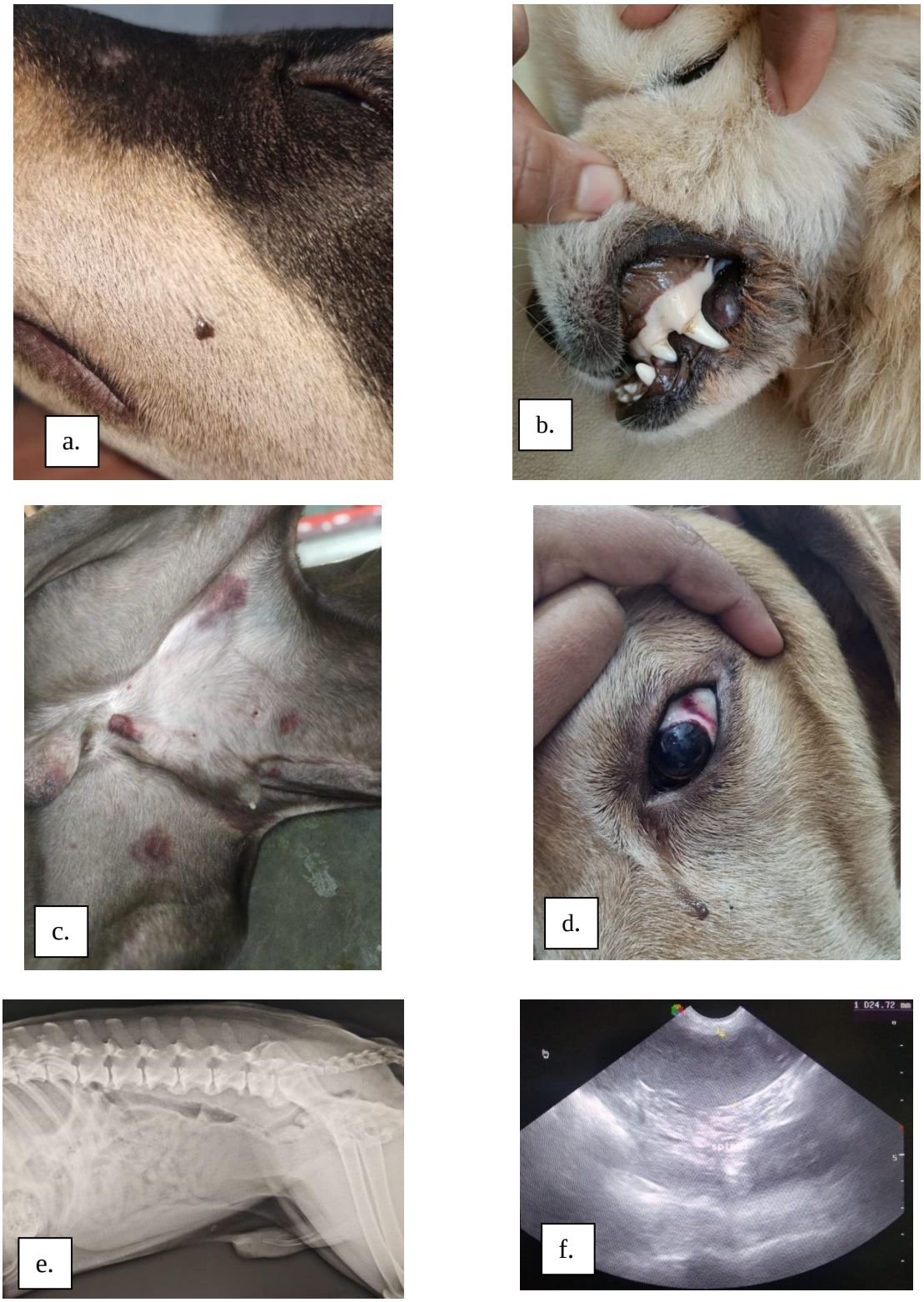

Fig. 1. Canine Ehrlichiosis or tick fever (*Ehrlichia canis*) in the dogs showing lesions: (a) Ticks on body, (b) Pale mucus membrane, (c) Subcutaneous haemorrhages on abdomen, (d) Scleral hemorrhage, and (e-f) radiography and ultrasonography showing splenomegaly

3. METHOD/DIAGNOSIS

3.1 Complete Blood Test

Approximately, 1 ml blood was collected in EDTA vial and 4 ml was collected in serum tube for complete blood profiling test of suspected dog. Automatic analyser (Celltac Alpha MEK-6500) was used to measure various haematological parameters. Further blood serum was collected for investigation of kidney and liver function tests.

3.2 The Antigen *Ehrlichia* + *Babesia gibsoni* + *Anaplasma* ab rapid test

It is a chromatographic immunoassay for the qualitative detection of *Ehrlichia*, *Babesia gibsoni* and *Anaplasma* antibodies in canine whole blood, serum, or plasma with a very high degree of accuracy. Each kit has a letter of "T" and "C" as test line and control line on the surface of the device. The presence of only one band ("C") within the result window indicates a negative result while the formation of two bands ("T" and "C") in the result window indicates a positive result of that pathogen. To perform the test, three drops of whole blood diluent was taken in a test tube. Then, one drop of whole blood of suspected dog was added and mixed. The mixture was placed into the wells of rapid test kits.

4. RESULTS

4.1 Complete Blood Test

The complete blood profiling of the suspected dog sample is represented in Table 1. On the basis of blood test, it was clear that the dog was anaemic as PCV and Hemoglobin were below the normal range, and suffering from thrombocytopenia. The renal and liver function test gave the values as given in Table 2, which indicated hepatic and kidney disturbances.

4.2 The Antigen *Ehrlichia* + *Babesia gibsoni* + *Anaplasma* ab rapid test

In the rapid test kits, the red line in ("T") was seen within the result window of *Ehrlichia*. This confirmed the presence of antibody IgG in dog against *E. canis*. Once diagnosis was confirmed to be Ehrlichiosis, a prolonged therapeutic management was advised to recover the ailing dog.

Table 1. Haematological parameters of dog suffering from Ehrlichiosis

Blood parameters	Values	Reference standard
WBC (10^3/µL)	13.4	5 – 14.1
RBC (10^6/µL)	5.04	6 – 7.9
Hb (g/dL)	9.8	12 - 19
PCV (%)	31.8	35 - 57
MCV (fL)	64.4	66-77
MCH (pg)	20.0	21 – 26.2
MCHC (g/dL)	31.1	32 - 36.3
Platelet count (lakhs per cmm)	0.56	2.11 - 6.21

Table 2. Renal and liver function test of dog suffering from Ehrlichiosis

Tests	Values	Reference standard
Renal Function Test		
Urea (mg/dL)	22.89	15 - 45
Serum Creatinine (mg/dL)	1.78	0.6 - 1.5
Serum Uric Acid (mg/dL)	4.17	2.5 - 7.0
Liver Function Test		
Serum Bilirubin total (mg/dL)	0.57	0.01 - 1.2
Conjugated (mg/dL)	0.21	0.00 - 0.30
Unconjugated (mg/dL)	0.36	0.02 - 1.0
SGOT or AST (IU/L)	140.31	8 - 40
SGPT or ALT (IU/L)	261.70	5 - 35
Serum Alkaline Phosphate (U/L)	177.26	80 - 306
Serum Protein Total (g/dL)	6.93	6 - 8
Albumin (g/dL)	3.81	3.5 - 5
Globulin (g/dL)	3.12	2.5 - 3

5. TREATMENT

The dog was treated with antibiotic Oxytetracycline @ 10 mg/kg I/V along with normal saline 250 ml I/V and Analgin @ 2.5 mg/kg BW I/V for first 3 days. From 3rd day onwards, dog was advised to give Tab. Rabeprazole @ 1mg/kg BW PO for 28 days before meal, Tab. Doxycycline @ 10mg/kg PO for 28 days to clear blood parasites and restore blood parameters, Tab. Metronidazole @ 15

Fig. 2. Rapid test kit for detection of *Ehrlichia*, *Babesia gibsoni* and *Anaplasma* specific antibodies

mg/kg PO for 28 days, Tab. Lisybin OD for 28 days as liver supplement and two doses of Imidocarb dipropionate @ 5 mg/kg BW I/M at 14 days interval. The owner was suggested not to give milk-based food 1 hr before and after doxycycline tablet. Also, for the control of ticks Fipronil topical application was advised. Dog started showing improvement in clinical signs after 2 dose of Doxycycline, and re-examination of blood after 20 days of starting the therapy gave negative results in the rapid test kit.

6. DISCUSSION

"In India *E. canis* infection has been reported from different part of country by varied prevalence rate" [3-8]. "The haematological examination showed marked anaemia, thrombocytopenia, decreased haemoglobin and packed cell volume" [9,7]. Decrease in level of platelets in severe cases results bleeding which is manifested as epistaxis, due to lack of clotting factor. The clinical sign of Ehrliciosis include persistent fever and anorexia, which were similar to the findings of Phuyal et al., [10]. Splenomegaly is common findings on radiographic examination. The rapid test kit was used for diagnosis where pathogen specific IgG antibody will be detected [11]. Therapeutic management included doxycycline @ 10 mg/kg orally for a period of 28 days along with supportive therapy but in a study by Shrestha [12], doxycycline @ 5 mg/kg was used. Doxycycline [13,14], both short and long acting Oxytetracycline [15,16], imidocarb dipropionate [17], and others have been reported to be effective against *E. canis*. It has been discovered that tetracycline treatment is successful at resolving clinical and laboratory abnormalities and getting rid of *E. canis* [18]. The prognosis becomes poor once dogs enter the chronic phase of disease [19]. "Dog recovered after 21 days of post treatment which suggests that continuous monitoring, specific, and appropriate supportive therapy as well as owner's compliance is key factors in elimination of the infection from blood in CME affected dog" [2].

7. CONCLUSION

Based on this study, canine chronic ehrlichiosis caused by *Ehrlichia canis* was associated with severe bone marrow hypoplasia, anemia, bleeding diatheses, and a high mortality rate. Coinfection with vector-borne agents did not appear to alter the course of disease, but further systematic investigation is required. Laboratory examination and Antigen Rapid Ab Test Kit confirms the Ehrliciosis in dog. Doxycycline at the dose rate 10 mg/ kg body weight orally and supportive therapy for 28 days completely removes *Ehrlichia canis* from the blood of infected dog. The infection can be prevented by controlling ticks on dogs. The disease can be managed well with suitable therapeutic regimens, if diagnosed and treated promptly at appropriate stage of infection.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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