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Canine monocytic ehrlichiosis and its therapeutic management in dogs

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Abstract

A randomised study was conducted in dogs with different age groups and sex which were presented with pyrexia, tick infestation and lymphnode enlargement, to Veterinary clinical complex, CVSc, Rajendranagar, Hyderabad. Detailed clinical examination revealed signs of icteric cmm, yellowish discoloration of skin, petechial heamorrhages on ventral abdomen, vomitings, diarrhea, paresis of hind limbs, ascites, edema of forelimbs and/or hindlimbs and blindness. Hematological parameters revealed anemia, thrombocytopenia, neutrophilia and lymphopenia. Serum biochemistry revealed elevation of ALT, AST, ALP, Direct Bilirubin, BUN, Creatinine and decreased levels of albumin. Upon ultrasonographic examination revealed splenomegaly, echogenic changes of liver, anechoic fluid in the abdomen, renomegaly. Further the Blood smear examination, Lateral flow assay, and PCR revealed positive for Ehrlichia canis. Based on history, clinical findings, heamatology, serum biochemistry, ultrasonographic findings, PCR these dogs were confirmed for canine monocytic ehrlichiosis and later these dogs were randomly divided into two groups 5 in each. Group I dogs treated with administration of doxycycline @ 10 mg/kg intravenously once daily for one week, followed by oral doxycycline at the same dosage for more 21days. Supportive therapy included intravenous fluid administration, Arbc syrup, and multivitamin supplementation. Group II dogs treated with administration of doxycycline @ 10 mg/kg intravenously once daily for one week, followed by oral doxycycline at the same dosage for more 21days and Inj. Imidocarb dipropionate @ 6.6 mg/kg of two doses in 14 days of time interval. Supportive therapy included intravenous fluid administration, Syrup Sharkoferrol, and multivitamin supplementation. Owing to the severity of anemia, a blood transfusion was also performed in some dogs. Whereas Group II dogs showed faster recovery and resolution of clinical signs compared to Group I dogs.

Keywords: anemia, ehrlichia canis, doxycycline, imidocarb dipropionate.

Introduction

Ehrlichiosis is an important tick-borne infection in dogs, caused by intracellular, gram-negative bacteria of the genus *Ehrlichia* under the family *Anaplasmataceae*. The principal pathogenic species affecting canines include *Ehrlichia canis*, *E. ewingii*, and *E. chaffeensis*. Among the various species, *Ehrlichia canis* is recognized as the causative agent of canine monocytic ehrlichiosis (CME), which is primarily transmitted by the brown dog tick, *Rhipicephalus sanguineus*. *E. canis* is a small, gram-negative, coccoid bacterium possessing a single circular chromosome. Within the tick vector, *Ehrlichia* species survive by invading and replicating inside endothelial cells, white blood cells, midgut cells, and salivary glands. These organisms have evolved multiple mechanisms to evade host defences, including interference with host cell signalling, modulation of vesicular trafficking, protection from oxidative stress, nutrient acquisition, and suppression of innate immune responses. Poor housing, inadequate management, and insufficient grooming practices increase the risk of tick infestation and subsequent exposure of dogs to ectoparasites (Bhadesiya *et al.*, 2015). The geographical distribution of the disease closely follows that of its vector (Smitha, 2002) [2]. CME typically progresses through three phases—acute, subclinical, and chronic—each associated with characteristic haematological alterations that may result in severe weight loss and systemic debilitation. According to Ettinger and Feldman (2010), thrombocytopenia, leukopenia, and

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bleeding tendencies are among the most consistent clinical findings in both acute and chronic stages of the disease. After an incubation period of one to three weeks, the disease progresses through the acute, subclinical, and chronic stages. Common clinical manifestations of ehrlichiosis include anemia, epistaxis, petechiae, ecchymoses, prolonged bleeding during estrus, hematuria, or melena, often associated with thrombocytopenia, platelet dysfunction, or vasculitis. Ocular complications are also frequently observed, such as anterior uveitis, corneal opacity, hyphema, retinal vessel tortuosity, chorioretinal lesions, subretinal hemorrhage, retinal detachment, and blindness. Confirmatory diagnosis by RT-PCR which is a gold standard test for diagnosis of canine monocytic ehrlichiosis in dogs.

Materials and Methods

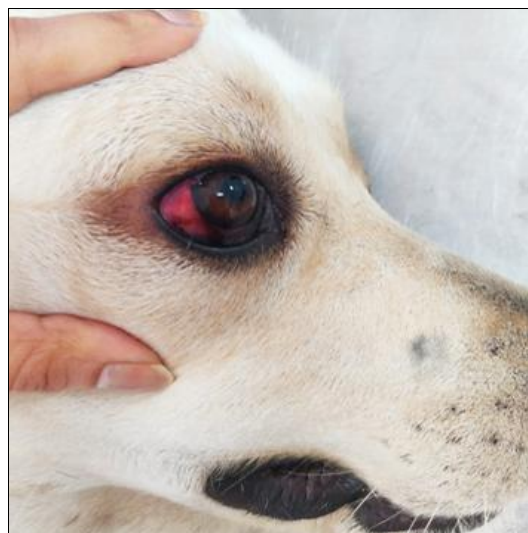
The present study was carried out in dogs presented to the Veterinary Clinical Complex, College of Veterinary Science, Rajendranagar, Hyderabad, between June 2025 and September 2025. Selection of suspected cases was based on a history of tick infestation and the presence of characteristic clinical signs. These animals were subjected to clinical and physical examinations, followed by diagnostic evaluations including complete blood count, serum biochemical analysis, radiography, ultrasonography, lateral flow assay, and polymerase chain reaction (PCR).

The affected dogs were randomly allocated into two groups, each comprising five animals. In Group I, therapeutic management involved the administration of doxycycline @ 10 mg/kg intravenously once daily for one week, followed by oral doxycycline at the same dosage for an additional 21 days, along with supportive therapy. Group II dogs received a similar doxycycline regimen, in addition to imidocarb dipropionate administered @ 6.6 mg/kg as two injections given 14 days apart, along with supportive treatment. The therapeutic efficacy was assessed based on improvement in clinical symptoms and normalization of hematological, biochemical, and other diagnostic parameters.

Results

Clinical signs

Clinical sign	No of dogs affected (n=10)
Fever	10
Anorexia	06
Inappetence	08
Lethargy	10
Pale CMM	08
Epistaxis	02
Melena	04
Episcleral congestion	02
Pedal edema	04
Scrotal edema	02
Lymphadenopathy	04
Vomiting	05
Petechial haemorrhages	05
Hyphema	01
Weight loss	06
Ascites	01
Seizures	01
Blindness	01



Episcleral congestion



Yellowish discoloration of skin



Enlargement of pre scapular lymph node (Lymphadenopathy)



Tick infestation

Table 1: Haematological Findings In *E. canis* Affected Dogs Before And After Therapy

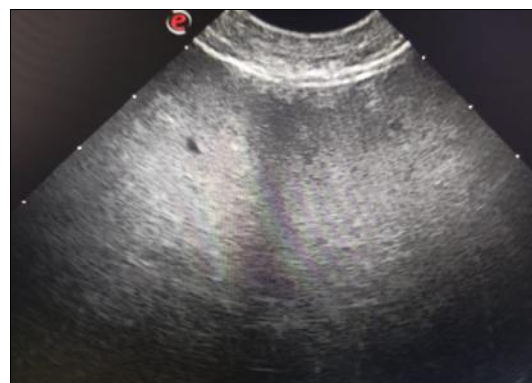
Parameter	Healthy Dogs (Control)	Before Therapy (<i>E. canis</i> infected)	After Therapy (Group I – Doxycycline)	After Therapy (Group II – Doxycycline + Imidocarb)
Hb (g/dl)	12.8 ± 0.7 ^a	7.9 ± 0.4 ^b	9.6 ± 0.5 ^{bc}	11.9 ± 0.6 ^a
TEC (×10 ⁶ /μL)	6.4 ± 0.5 ^a	3.9 ± 0.7 ^b	5.4 ± 0.4 ^{bc}	6.4 ± 0.4 ^a
PCV (%)	37.9 ± 1.3 ^a	26.5 ± 1.0 ^b	33.8 ± 1.1 ^{bc}	36.7 ± 1.4 ^a
TLC (×10 ³ /μL)	12.5 ± 1.1 ^a	21.6 ± 1.4 ^a	14.9 ± 1.5 ^{bc}	13.8 ± 1.0 ^b
PLT (×10 ⁵ /μL)	2.9 ± 0.5 ^a	0.8 ± 0.3 ^c	1.9 ± 0.4 ^b	2.8 ± 0.5 ^a
Neutrophils (%)	68.7 ± 2.7 ^b	83.4 ± 4.1 ^a	75.5 ± 2.8 ^{bc}	70.4 ± 2.3 ^b
Lymphocytes (%)	23.5 ± 1.9 ^a	10.8 ± 1.5 ^b	19.2 ± 1.8 ^{bc}	23.4 ± 1.3 ^a
Monocytes (%)	2.9 ± 0.9 ^a	1.3 ± 0.4 ^b	2.2 ± 0.5 ^{bc}	2.7 ± 0.6 ^a

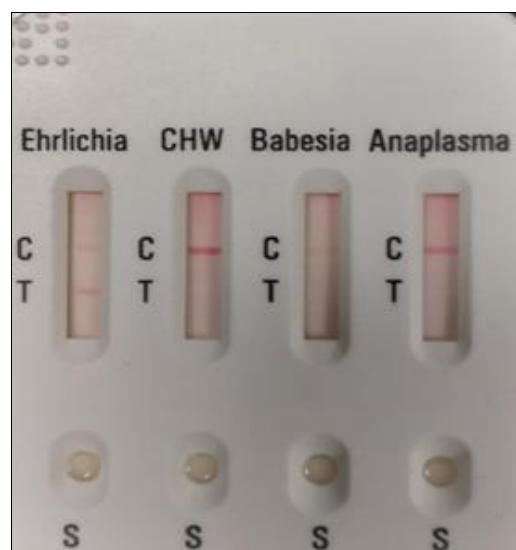
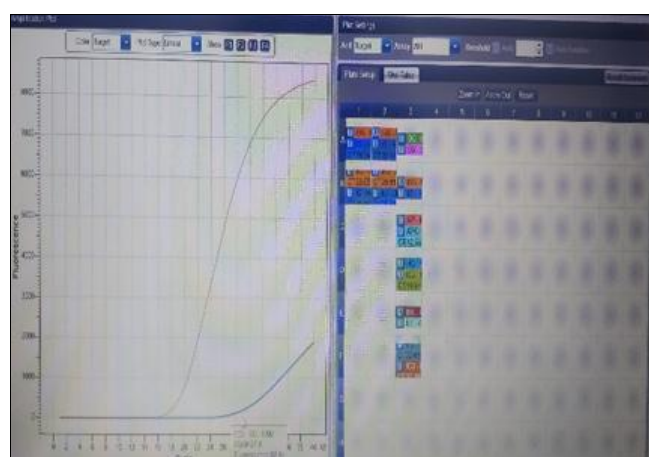
Superscripts (^a, ^b, ^c) indicate significant difference ($P < 0.05$) between groups in each row.

Table 2: Biochemical findings in *E. canis* affected dogs before and after therapy

Parameter	Healthy dogs (Control)	Before Therapy	After Therapy (Group I – Doxycycline)	After Therapy (Group II – Doxycycline + Imidocarb)
ALT (U/L)	41.56 ± 2.05 ^b	87.24 ± 3.32 ^a	57.42 ± 2.74 ^{bc}	43.28 ± 2.40 ^b
ALP (U/L)	77.62 ± 4.42 ^b	141.16 ± 5.37 ^a	112.34 ± 3.08 ^{bc}	82.75 ± 2.95 ^b
AST (U/L)	34.18 ± 1.74 ^b	78.54 ± 3.10 ^a	54.68 ± 2.34 ^{bc}	38.38 ± 1.95 ^b
Total Protein (g/dl)	6.72 ± 0.41 ^b	8.86 ± 0.61 ^a	7.82 ± 0.27 ^{bc}	6.89 ± 0.31 ^b
Albumin (g/dl)	3.52 ± 0.21 ^a	2.02 ± 0.13 ^b	2.46 ± 0.13 ^{bc}	3.46 ± 0.10 ^a
Globulin (g/dl)	3.10 ± 0.18 ^b	6.42 ± 0.37 ^a	4.76 ± 0.25 ^{bc}	3.52 ± 0.16 ^b
Total Bilirubin (mg/dl)	0.23 ± 0.05 ^b	0.72 ± 0.20 ^a	0.38 ± 0.05 ^{bc}	0.28 ± 0.04 ^b
BUN (mg/dl)	17.62 ± 1.35 ^b	35.48 ± 2.08 ^a	25.2 ± 1.84 ^{bc}	18.59 ± 1.34 ^b
Creatinine (mg/dl)	1.12 ± 0.15 ^b	2.94 ± 0.28 ^a	1.79 ± 0.31 ^{bc}	1.38 ± 0.16 ^b

Values bearing different superscripts in a row differ significantly ($P < 0.05$).

Radiograph of *E. canis* affected dog showing SplenomegalyUsg of *E. canis* affected dog showing SplenomegalyRadiograph of *E. canis* affected dog showing increased radio-opacity in peritoneal cavity suggestive of Ascites with Ground glass appearanceUsg of *E. canis* affected dog showing Splenic congestion

Lateral flow assay showing positive for *E. canis*RT-PCR showing detection of *E. canis*

Therapeutic Management of The Patient

After laboratory confirmation of *Ehrlichia canis* infection, the affected dogs were randomly divided into two groups of 5 in each. Group I dogs were treated with administration of doxycycline @ 10 mg/kg intravenously once daily for one week, followed by oral doxycycline at the same dosage for more 21 days. Supportive therapy included intravenous fluid administration, Arbc syrup, and multivitamin supplementation. Group II dogs were treated with administration of doxycycline @ 10 mg/kg intravenously once daily for one week, followed by oral doxycycline at the same dosage for more 21 days and Inj. Imidocarb dipropionate @ 6.6 mg/kg of two doses in 14 days of time interval. Supportive therapy included intravenous fluid administration, Syrup Sharkoferrol, and multivitamin supplementation. To correct hypoproteinemia, an intravenous essential amino acid preparation was infused at 20 mL daily with fluids for seven days. Owing to the severity of anemia, a blood transfusion was also performed in some dogs. Following treatment, the hematological and biochemical profiles of dogs affected with *Ehrlichia canis* before and after treatment are shown in Tables 2 and 3, respectively. Post-therapy evaluation revealed a marked improvement in Group II dogs compared to Group I, with faster resolution of clinical signs and better restoration of hematological and biochemical values, suggesting a superior therapeutic efficacy in Group II.



Animal receiving blood transfusion

Discussion

The most prominent clinical sign observed in this case was a persistent fever of 103.4°F, consistent with the findings of Phuyal [7]. Marked haematological alterations were observed, similar to those reported by Nair [9], including decreased haemoglobin concentration, low packed cell volume (PCV), and thrombocytopenia, aligning with the results of Phuyal [7]. Thrombocytopenia in canine ehrlichiosis is attributed to both direct and indirect effects of the pathogen. The organism shortens platelet lifespan directly and indirectly suppresses bone marrow activity, thereby inhibiting erythropoiesis and platelet production. Severe thrombocytopenia may lead to bleeding tendencies due to impaired clot formation. Epistaxis observed in this condition due to this reason. The disease was diagnosed based on the rapid test kit. Usually antibody pathogen specific IgG is detected [9]. In this case as the diagnosis was confirmed using a rapid antigen detection test. The faint band observed in the test well suggested a low antibody concentration, which may occur due to delayed antibody response. As pathogen-specific IgG antibodies may take several weeks to develop, serological testing is often unreliable in the early phase of infection. Moreover, antibodies can persist for extended periods following recovery, making serological assays less effective in differentiating acute from past infections, particularly in endemic areas where exposure is frequent.

Conclusion

Based on cbp, serum biochemistry, a positive result from the *E. canis* antigen rapid test and PCR confirmed the diagnosis of ehrlichiosis in the dog. Treatment with doxycycline at 10 mg/kg body weight, and Inj. Imidocarb dipropionate @ 6.6 mg/kg of two doses in 14 days of time interval. Supportive therapy included intravenous fluid administration, Syrup Sharkoferrol, and multivitamin supplementation along with blood transfusion, effectively cleared *Ehrlichia canis* from the blood, leading to complete clinical recovery.

Conflict of Interest

Not available

Financial Support

Not available

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