Case Report

Successful Therapeutic Management of Trypanosomosis in a Dog-A Case Report

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Abstract

Background: Trypanosomosis is one of the most important and deadliest diseases of canines. Usually within 3 to 4 weeks an infected dog dies in the acute form of the disease. The use of inappropriate doses of anti-trypanosomatid drugs in animals leads to the development of huge resistance in the organisms.

Methods: The present study communicates the successive therapeutic management of clinical trypanosomiasis with five doses of diminazine aceturate injection. One mongrel dog came with the clinical signs of persistent fever, tachycardia, severe dehydration, pale mucous membrane, corneal opacity, prolonged recumbency, and enlargement of superficial lymph nodes. A Giemsa-stained thin blood smear revealed the presence of Trypanosoma organisms. Haematobiochemical parameters revealed lowered total leucocyte count, haemoglobin, total platelet count, serum total protein, and blood glucose levels and elevated levels of alkaline phosphatase, serum creatinine, and blood urea nitrogen.

Results: We observed the animal responded after the third day of post-therapy, and the clinical and haematobiochemical improvement was recorded after twenty days of post-therapy. The corneal opacity completely subsides after 28 days consequently.

Conclusions: During our study we found that the proper significant dosing of diminazine aceturate can cure the Trypanosomosis in dogs.

Keywords: Corneal opacity; Diminazineaceturate; *Trypanosoma*spp; Dog; Thin smear

Introduction

Trypanosomosis is a fatal haemoprotozoan disease caused by the most pathogenic flagellate protozoan *Trypanosoma*spp. It affects a wide variety of domestic and wild hosts, including camels, horses, cattle, buffaloes, and dogs (1, 2). The dog usually shows two forms of the disease likely the American form (Chagas disease) due to *Trypanosomacruzi* infection and the African form (surra), due to *T. evansi*, *T. vivax*, or *T. congolense*. The organisms are mainly transmitted biologically by *Glossina* spp. (tsetse flies) and the latter mechanically by various blood-sucking arthropods i.e. *Stomoxys* and *Tabanus* (3, 4). The severity of canine trypanosomosis varies from acute to subacute and chronic forms of the disease in a dog infected with *T. evansi* and is characterized by anorexia, intermittent fever, corneal opacity, anaemia, emaciation, dullness, apathy, dehydration, pale mucous membranes, weight loss, conjunctivitis, sexual excitement, staggering gait, edema of the throat with changed vocal cord, posterior paralysis and impaired hearing (2, 5). Dogs usually die within two to

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four weeks with the acute form of the disease (6). Canine trypanosomosis can be diagnosed by parasitological, molecularly, and immunodiagnostic techniques. The diagnosis in most of the cases is done by demonstration of the organism in a thin blood smear but few of the case studies organisms were demonstrated in aqueous fluid (7). Treatment of trypanosomosis relies on the use of diminazeneaceturate which is effective for the treatment of disease in domestic and wild canines. However, a single dose of a drug is not sufficient for dogs, horses, and mules, since diminazeneaceturate neither crosses the blood-brain barrier nor insufficient doses were unable to control the *T. evansi* infection (8, 9). However, relatively few canine trypanosomosis case reports were documented from Kolkata caused by a variety of pathogenic trypanosome organisms. The present work communicates; the therapeutic efficacy of five doses of diminazeneaceturate against canine trypanosomosis in a six-month-old female Mongrel dog in Kolkata, West Bengal.

Clinical case History

A six-month-old female Mongrel dog was presented to the Belgachia Veterinary Hospital, Kolkata, WBUAFS, with a history of anorexia, dullness, persistent fever, tachycardia, severe dehydration, pale mucous membrane, emaciation, corneal opacity (Fig. 1) and prolonged recumbency. Close clinical examinations revealed petechial haemorrhages over the skin of the abdominal region and swelled superficial lymph nodes.

Materials and Methods

The blood sample was aseptically collected from the ear after manual pricking of the ear vein with the application of a spirit swab and two drops of blood were taken in a slide. For the presence of any parasites, a wet blood smear was prepared and examined carefully. Thin blood smears were performed after manual fixation in methanol; they were further stained in Giemsa stain and finally, the slides were washed three times with buffered distilled water for differentiation and observed microscopically with oil-immersion objectives (X100). A further blood sample was collected from the cephalic vein for detailed haematological and biochemical studies. The Haematological and biochemical tests were performed with an autoanalyzer.

Results

Haemato-biochemical findings

The haematological findings were as haemoglobin (8.5 gm/dl), total leucocyte count (6500/cu.mm), neutrophils (43%), eosinophils (18%), lymphocyte (36%), monocyte (02%), platelet (255×10^3 /cu.mm). Biochemical findings were glucose (40 mg/dl), total protein (4.2 gm/dl), albumin (2.0 gm/dl), globulin (2.2 gm/dl), creatinine (1.2 mg/dl), blood urea nitrogen (10 mg/dl), SGPT (40 IU/L), alkaline phosphatase (116 IU/L). The recorded haemato-biochemical findings pre and post-therapy are shown in Table 1. The haematological and biochemical analysis of the blood of the infected animal showed anaemia, thrombocytopenia, hypoglycemia, hypoproteinemia, elevated level of blood urea nitrogen, increased level of alkaline phosphatase, and elevated serum creatinine. A wet blood smear from peripheral blood revealed the presence of motile trypanosomes under light microscopy. Thin blood smears revealed numerous elongated trypanosomes approximately 22.3±2.45 microns in length with a centrally located nucleus, a sub-terminal kinetoplast, a well-defined undulating membrane, and a substantial free flagellum (*T. evansi*, *T. brucei* or *T. vivax*) outside the red blood cells (Fig. 2).

Treatment

The dog was treated with five doses of diminazene aceturate-Phenazone combination (Inj. Berenil-RTU) @ 3.5 mg/kg body weight deep intramuscularly daily for 5 days, Pheniramine Maleate injection (Inj. Avilin-Vet) @ 0.5ml Intramuscularly daily for 5 days, Inj. DNS @ 20 ml/kg BW Intravenous daily for 7 days,

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Inj. Conciplex (Vitamins B complex) @ 1 ml Intravenous daily with DNS for 7 days, tablet Ursodeoxycholic Acid (tab. Udiliv (150mg) @ 1 tablet PO orally daily in the morning for 30 days, tablet Acetazolamide (tab. Diamox (250 mg) @ 1/2-tab PO twice daily for 10 days and tablet Mecobalamin (tab. Methycobal (500 mcg) 1-tab PO daily at night for 30 days. The dog started responding to the treatment after the third day of the therapy and complete recovery with diminished corneal opacity was observed within 28 days of post-treatment, alongside near normal haemato-biochemical parameters were observed. After 28 days, a thin blood smear revealed the absence of any haemo-parasites (*Typanosoma* spp).

Table 1. Haematological and biochemical assessment before and after treatment

Parameter	Before Treatment	After Treatment	Reference Value
Hematology			
Hb (gm/dl)	8.5	12.8	12-18
Total leucocyte count/cumm.	6500	8500	6000-15000
Neutrophil%	43	58	55-80
Eosinophil%	18	10	2-8
Basophil%	00	00	0-1
Lymphocyte%	36	28	15-30
Monocyte%	02	03	2-6
Platelet×10^3/cumm.	255	370	150-500
Serum biochemistry			
Total Protein (gm/dl)	4.2	6.0	4.5-7.5
Albumin (gm/dl)	2.0	2.6	2.0-3.5
Globulin (gm/dl)	2.2	3.4	2.7-4.4
Glucose (mg/dl)	40	80	76-119
BUN (mg/dl)	10	8.3	7-25
Creatinine (mg/dl)	1.2	0.8	0.5-1.5
SGPT (IU/L)	40	27	10-75
Alkaline phosphatase (IU/L)	116	85	15-100

Fig. 1. Dog suffering with corneal opacity due to trypanosomosis

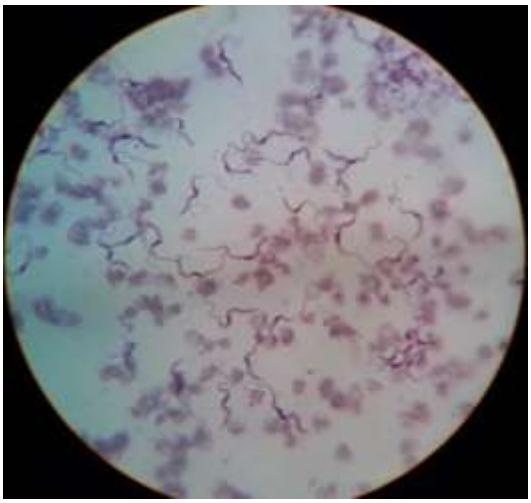

Fig. 2. Microscopic examination of a thin blood smear showing *Trypanosoma* spp. (Giemsa stained, 100X)

Fig. 3. Dog showed complete recovery from corneal opacity after treatment

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Discussion

Trypanosomosis is of great economic, medical, and veterinary importance infecting a wide range of domestic and wild animals including canines (10). The severity of canine trypanosomosis varies from acute to sub-acute to chronic form although the disease is very much limited in the canine population (11). Limited studies showed that a variety of trypanosomes namely *T. evansi*, *T. congolens*e, *T. brucei* and *T. cruzi* can infect domestic and wild dogs (12, 13). The clinical findings and morphological features of the trypanosome organisms found in the present study is in agreement with different reporters (3, 12-17). The haemato-biochemical findings of several parameters inferred from the present study are in agreement with the findings of many reporters (10, 18-22). Anemia in the affected dog could be due to intravascular haemolysis because of the adsorption of the *Trypanosoma* antigen on the surface of RBC (6). Corneal opacity is because of the descent of parasites along the optic artery from the brain with subsequent induction of immune complexes into aqueous humor. Refractory hypoglycemia was noticed because of the utilization of circulatory blood glucose by the parasites which is in agreement with previous studies (22, 23). Serum albumin level is reduced because of decreased biosynthesis of the liver and loss of plasma protein albumin in urine (23). Tissue damage and kidney dysfunction lead to the development of uremia and increased levels of creatinine (22). The reported clinical findings of our study are in agreement with the findings of previously reported (16, 24). Diminazeneaceturate is the only commonly used drug found to be effective in the control of trypanosomosis in animals around Africa and other geographical regions over the last forty years (24). Diminazeneaceturate was used as both trypanocidal and babesiacidal drugs for domestic livestock. It is only recommended for therapeutic use Because of rapidly excreted activity. The main activity is by binding trypanosomal kinetoplast DNA and thus inhibits RNA primer synthesis finally resulting in the accumulation of replicating intermediates, thereby inhibiting kDNA replication (17). Due to its greater therapeutic index and low occurrence of resistance, diminazene aceturate is typically favored against *Trypanosoma*spp (25). According to researchers, using diminazineaceturate intramuscularly (IM) every day for five days at a dose of 3.5 mg/kg resulted in higher blood-brain barrier penetration and the elimination of the parasite from the brain (26). A single high dose of diminazineaceturate @ 7 mg/kg could be highly toxic in camels and dogs. However excessive plasma concentration of diminazeneaceturate, high doses, and adequate doses leads to the development of diminazeneaceturatetoxicosis (27, 28). The hypoglycemia induced by *Trypanosomosis* was treated by intravenous dextrose administration. Tablet acetazolamide was given to lower the intracranial pressure. The mechanism of action is by inhibiting an enzyme carbonic anhydrase in the eye thus inhibiting the movement of sodium ions into the posterior chamber of the dog eye and also reducing the production of intra-occular fluid. Injection conciplex was given as a vitamin supplement for its anti-oxidant properties and as a liver supplement tablet, Udiliv was given. Tablet ursodeoxycholic acid is given to the present dog suffering from secondary hepatitis as reflected in serum biochemical parameters. Ursodeoxycholic acid significantly decreased serum concentration of a variety of liver enzymes such as alanine aminotransferase, aspartate aminotransferase, and alkaline phosphatase in primary or secondary or in chronic active hepatitis conditions or other cholestatic conditions in dogs. Injection Avilin VET was given to prevent the anaphylactic reactions due to the administration of Diminazineaceturate. Tablet Methycobal 500 mcg (Methylcobalamin) was given to check the nervous symptoms and anemia as well. Improvement con-

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cerning vital and haemato-biochemical parameters took 15–20 days, and the corneal opacity took 4 weeks to complete recovery (Fig. 3). Further no recurrence of the disease was reported in that animal. However, from the present study, it is concluded that five doses of diminazeneaceturate @ 3.5 mg/kg body weight deep intramuscular injection is very effective for control of *Trypanosoma* infection in canines.

Conclusion

From the present study, it is concluded, based on morphological features, that this is a case of canine trypanosomosis caused by trypomastigote form of trypanosomes. Based on these findings it is a case of canine trypanosomosis of mixed infection. Canine trypanosomosis or surra can be caused by a variety of pathogenic trypanosomes like *T. evansi*, *T. congolense* or *T. vivax*, *T. brucei* or *T. cruzi* (12, 13). Morphological identification of the parasites requires specialized knowledge and techniques like biometrical and morphometrical analysis (29). However accurately identification of organisms up to species level can be challenging which requires molecular techniques (30). The dog was responded after third day of post therapy and excellent recovery was noticed after twenty days of post treatment. Since five doses of diminazeneaceturate completely recovered the infected dog and the haemato-biochemical parameters become normal with supportive therapy. Tablet ursodeoxycholic acid was successfully used to treat primary or secondary hepatic insufficiency and other cholestatic condition. The corneal opacity was successfully treated with tablet acetazolamide. From the best to our knowledge, it is the first case study of trypanosomiosis in dog from Kolkata which was successfully treated with five doses of diminazeneaceturate.

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Ethical considerations

All methods (blood collection from the animal and administration of parenteral medications) complied with the institution's ethical guidelines.

Pradyumna Chakraborty-Writing original paper, treatment, blood sample collection, biochemical test, Sulanki Sarkar- Blood smear and haemoprotozoa detection, Sudip Das- Morphological identification, BishalDebbarma- Treatment and editing, Shubhamitra Chaudhuri- Investigation, editing, supervision.

Conflicts of interest statement

The authors declare that there is no conflict of interest.

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