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Diagnostic and therapeutic Studies of infectious canine cyclical thrombocytopenia (ICCT) in *Anaplasma platys* infected canines

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Abstract

In this study 5 dogs aged between 5-7 years were presented to the Referral Veterinary Polyclinic, Indian Veterinary Research Institute Izatnagar (U.P.) with the complaint of Pyrexia, Inappetence, depression, melena. The systematic investigations did show significant thrombocytopenia and elevated total leucocyte count (TLC). Blood smear examination revealed presence of *Anaplasma platys* organism within thrombocytes. In the institution treatment of dogs with doxycyclin along with supportive therapy brought successful recovery in 4 weeks.

Keywords: Pyrexia, Thrombocytopenia, *Anaplasma platys*, Doxycyclin

Introduction

There is two types of *Anaplasma* pathogenic species that causes Canine anaplasmosis; *Anaplasma platys*, lead to infectious canine cyclical thrombocytopenia (ICCT) or Canine thrombocytic anaplasmosis (CTA) and *A. phagocytophilum*, lead to granulocytic anaplasmosis (Arun *et al.*, 2017) [2]. Infectious canine cyclical thrombocytopenia (ICCT) is an infectious disease caused by *A. platys* which an obligate intraplatelet rickettsial organism organized in clusters, called morulae, and frequently, with the possibility of concomitant infection (Cohn, 2003; Silva *et al.*, 2012) [4, 18]. *A. platys* is primarily transmitted through the bite of the tick, *Rhipicephalus sanguineus* to dogs (Arun *et al.*, 2017) [2]. This infectious disease is of huge significance for small animals as well as public health, since they are increasing numbers of in dog ownership and because there is proof that these organisms can also affect humans (Maggi, 2013) [12]. The significantly higher hematological alteration in infection of *A. platys* is thrombocytopenia as a outcome of direct injury to platelets, megakaryocytes as well as promegakaryocytes of the bone marrow by replicating organisms as well as immune-mediated mechanisms by antiplatelet antibodies (Arun *et al.*, 2017; De, 2014; Gaunt *et al.*, 2010) [2, 5, 9]. Infected dogs are generally showing signs of significant haemorrhage due to thrombocytopenia and prolonged bleeding time seen in some of the dogs from the site of tick removal (Stiles, 2015) [20]. This infection can be successfully managed with doxycycline and removal of ticks through acaricidal therapy (Arun *et al.*, 2017) [2].

Case History

5 dogs aged between 5-7 years were presented to Referral Veterinary Polyclinic of Indian Veterinary Research Institute Izatnagar (U.P.) with history of pyrexia ($103.8 \pm 0.47^\circ$ F), inappetence, depression, Malena and past tick infestations. The Dogs had been dewormed and immunization as per standard regimen.

Clinical examinations and findings

Clinical examinations, revealed congested mucous membrane, tachycardia, and tachypnoea, pain reflexes seen during abdominal palpation and enlargement of popliteal lymph nodes. The microscopic blood smear examination by Giemsa staining revealed the presence of *A. platys* as multiple basophilic inclusions (morulae) within thrombocytes. The detailed hematological examination revealed that increased total leucocyte count and marked thrombocytopenia (Table 1). On the basis of clinical signs and laboratory diagnosis, the case was diagnosed as Infectious Canine Cyclical Thrombocytopenia (ICCT).

Differential diagnosis

Differential diagnoses were done through *A. platys* cause primarily only thrombocytopenia. Canine monocytic

ehrlichiosis leads to anemia, leucocytosis as well as thrombocytopenia during routine laboratory evaluations (Silva *et al.*, 2012) [18].

Table 1: The hematological parameters of affected dog

Parameter	Reference range*	0day	14 th day	21 th day	28 th day
Hb (g/dl)	11.9-18.9	13.68 ± 0.47	-	-	15.35± 0.43
TEC (10 ⁶ /cmm)	4.95-7.87	5.21 ± 0.20	-	-	5.31± 0.43
TLC (10 ³ /cmm)	5.0- 14.1	29.33± 0.84	-	-	18.60± 0.31
Neutrophils %	58-85	84.05 ± 0.67	-	-	81.73 ± 0.9
Lymphocytes %	8-21	16.66 ± 0.82	-	-	13.62± 0.34
Monocytes %	2-10	2.00 ± 1.7	-	-	6.00 ± 2.2
Eosinophils %	0-9	0	-	-	0
Basophil %	0-1	0	-	-	0
Platelet count (10 ⁶ /cmm)	211-621	21.35 ± 12.68	148.56± 10.46	138± 18.39	258 ± 8.46

*Source: Merck Veterinary Manual, 11th Edition

Treatment and outcomes

Treatments were instituted with Doxycycline @ 5milligram per kg Body Weight, PO, twice a day for 28 days along with Pantaprazole @ 0.5milligram per kg Body Weight OD for 28 days. Inj. Meloxicam @ 0.5milligram per kg Body Weight was given as antipyretic and prednisolone @ 2milligram per kg Body Weight PO BID in tapering dose for initial 5 days. Apart from the ongoing treatment oral hepatotonic syrup (silybon) 5ml PO BID for 28 days and multivitamin syrup Becasule (B-complex with vitamin C) was prescribed at 5ml PO OD for 14 days after 14th day of treatment.

The hematological changes were estimated on day 0, days 14 & 28 of initiation of therapy. There were significant elevation were observed in total thrombocyte count and reduces the total leucocyte count after the recovery period. Appetite and activity had been markedly improved and blood smear examination were negative for *A. platys* after 28 days of therapy.

Discussion

Rickettsial pathogenic species *A. platys* is an obligate intracellular organism causing infectious canine thrombocytopenia (ICCT) which is mainly transmitted by the Rhipicephalus sanguineus commonly known as brown dog tick (Arun *et al.*, 2017 and De, 2014) [2, 5]. The organism were found singly, in pair or in group (morulae) within the platelet therefore in Giemsa stained blood smear it has not been isolated, cultured and appears (Arun *et al.*, 2017) [2]. Rickettsial pathogenic species *A. platys* causes Canine Cyclical Thrombocytopenia which is diagnosed by visualization of inclusions in thrombocytes of canine (Ettinger, 2005 and Arun *et al.*, 2017) [7, 2]. The infection diminishes with time due to its cyclic nature, infected thrombocytes number declines with subsequent parasitaemias as a result organism being only sporadically present as the thrombocytopenia resolves. (French and Harvey, 1983) [8].

Infected dog have been reported to show symptoms and in the case of Thrombocytopenia rarely show bleeding symptoms due to the cycling nature of the parasitised platelets, the platelet number start to increase again to normal level only to decrease again after one to two weeks (Stiles, 2015) [20]. Giemsa-stained blood smear examination can be unsatisfactory and time consuming could identify the inclusions which were characterised by basophilic and intracytoplasmic (Bradford, 1996) [3] and the parasitized platelets manifestation are rare or absent in thrombocytopenia. The intensity of thrombocytopenia gradually decrease with

each subsequent cycle (Arun *et al.*, 2017) [2].

The clinical signs in *A. platys* affected dogs have pyrexia, depression, in appetite, weight loss, pale mucous membranes, petechial hemorrhages, Melena, lymphadenomegaly, bilateral uveitis and epistaxis (Sainz *et al.*, 2015) [16]. The clinical signs observed in infected dogs, pyrexia, inappetence depression, and enlarge lymphnodes. In the hematological examination, thrombocytopenia was recorded. Previously the same clinical sign and hematological findings were reported in *A. platys* infection (Santos *et al.*, 2009; Dyachenko *et al.*, 2012; Arun *et al.*, 2017) [17, 6, 2]. Therapeutic application of doxycycline for 21-28 days leads to eliminate the organism and improved the condition of the dog (Leah, 2009; Arun *et al.*, 2017; Arraga-Alvarado *et al.*, 2014) [11, 2, 1]. The similar therapeutic management was started and the case showed improvement in clinical symptoms with thrombocytes count. in the present case administration of pantoprazole to diminishing gastric acidity (Patel *et al.*, 2018) [15]. Use of Prednisolone for management of immune-mediated thrombocytopenia which is important in subsequent thrombocytopenic cases during the disease (Dyachenko *et al.*, 2012 and Arun *et al.*, 2017) [6, 2]. Vitamin B-Complex helps in neuro-muscular electrical conduction efficiently along with regulate gastrointestinal movement and Vitamin C promotes collagen formation and reduce oxidative stress which lead to prevention and healing of haemorrhages. the use of ascorbic acid and silymarin significantly it reduced an antioxidant named malondialdehyde level (MDA) in the hepato-renal system (Bhatt *et al.*, 2018) [19].

Conclusions

Infectious canine thrombocytopenia (ICCT) can be successfully treated by Doxycycline with supportive therapy as well as proper nursing and care of infected dog.

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