CASE REPORT

Subacute Canine Monocytic Ehrlichiosis in a Two Month Old Siberian-Husky Puppy – Diagnosis and Therapeutic Management

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Canine monocytic ehrlichiosis (CME) caused by *E. canis* is most pathogenic and transmitted by the tick vector *Riphicephalus sanguineus* with non-regenerative anaemia and thrombocytopenia as common haematological abnormalities (Piratae *et al*., 2019). The disease may progress as acute, sub-acute and chronic, and in acute form, fever, anorexia, ocular discharge, petechiae, epistaxis, pale mucosae, bleeding signs, lymphadenopathy, and neurological signs may be observed (Waner and Harrus, 2013). In chronic phase, severe pancytopenia due to bone marrow hypoplasia is characteristic, which leads to severe leukopenia, anaemia, and thrombocytopenia resulting in death (Angkanaporn *et al*., 2022). Usually, the detection of *E. canis* (morulae) in dogs by conventional microscopy becomes very difficult owing to the low parasitaemia (Singh *et al.,* 2021) and thus failure of detection in an early stage leads to chronic myelosuppressive form, which is often fatal. Siberian husky is the breed highly susceptible to CME, however, the incidence in this breed is rarely reported in India (Singh *et al*., 2021). This study reports an early diagnosis of sub-acute ehrlichiosis in a Siberian husky puppy and it's successful therapeutic management.

Case History and Observations

A two month old male Siberian husky puppy (Fig. 1) was presented to the Veterinary Clinical Complex, Veterinary College and Research Institute, Namakkal (Tamil Nadu, India) with the complaint of normal appetence, vomiting and melena (Fig. 2a) without any offensive odour since 3 days. The puppy had no history of vaccination and deworming. Clinical examination revealed normal body condition, pale pink mucous membrane, enlarged popliteal lymphnode, body temperature of 38.4°C, heart rate of 110 beats/min, capillary refill time >2 min and mildly sunken eyeball. The faecal sample collected and subjected to microscopic examination to rule out hook worm infestation by ancylostomes revealed no parasitic eggs. The faecal sample subjected to lateral flow assay (LFA) based immuno-chromatographic test (Pet X®, J & B Biotech Ltd, UK) also proved negative for canine parvo virus-2 (CPV-2) infection (Fig. 3a). The whole blood sample was collected for haematology, and the serum sample subjected to immunochromatography test (Pet X®) to detect antibodies to *Ehrlichia canis*, proved positive for ehrlichiosis (Fig. 3b). The whole blood and serum samples were analysed for haemato-biochemical changes before and after treatment.

Haemato-biochemical analysis before treatment revealed a decrease in haemoglobin, packed cell volume (PCV), RBC count, total protein, albumin and globulin, with an increase in levels of lymphocyte count, alkaline phosphatase (ALP) and phosphorus. On day-14 post-treatment, a decrease in RBC count, Hb, PCV, neutrophils, total protein, globulin, and an increase in WBC count, lymphocytes, albumin, ALP and phosphorus levels were noticed. On day-21, all the haemato-biochemical values were found to be within normal range (Table 1). The case was diagnosed as sub acute ehrlichiosis based on the clinical signs and seropositivity to *E. canis* by immunochromatography test.

Treatment and Discussion

The specific therapy included doxycycline @ 10 mg/kg b.wt., IV, once daily, dextrose normal saline @ 10 mL/kg b.wt., IV, vitamin B12 @ 1.0 mL, IV for first three days, as doxycycline is the drug of choice for clinical recovery from CME (Mylonakis and Theodorou, 2017). The case was then treated with oral doxycycline @ 5.0 mg/kg, twice daily, and haematinics to treat

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Fig. 1: Treatment of a 2 month old Siberian husky puppy affected with CME

Fig. 2: (a) Melena shown by the two month old Siberian-husky breed before treatment, and (b) Normal stool 14 days post-treatment

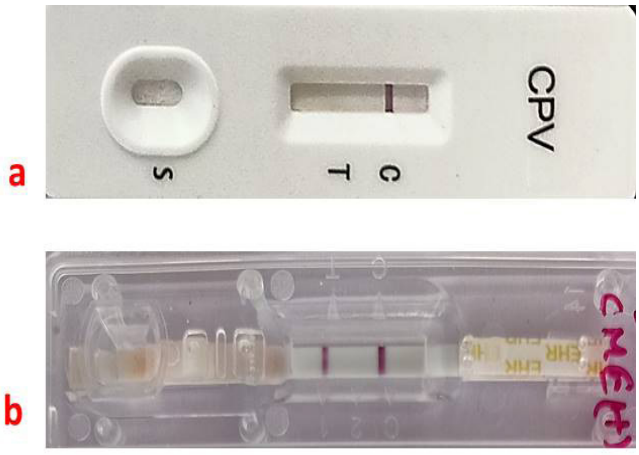

Fig. 3: Immunochromatography test (ICT) of a two month hold Siberian-Husky breed showing (a) negativity for CPV-2 virus in the stool and (b) positivity for CME in the serum

Table 1: Haemato-biochemical changes in a Siberian-Husky dog affected with *Ehrlichia canis*

Haemato-biochemical Parameters	Before treatment	Day-14 post-treatment	Reference values
Hb (g/dL)	8.30	10.50	11.9-18.9
PCV (%)	28.30	29.50	35-57
RBC ($\times10^6$/µL)	4.70	4.80	4.9-7.8
WBC ($\times10^3$/µL)	13.80	14.60	5.0-14.1
Platelet ($\times10^3$/µL)	505	608	211-621
Neutrophils (%)	67	46	58-85
Lymphocytes (%)	26	46	8-21
Monocytes (%)	07	8	2-10
Eosinophils (%)	-	-	0-9
Total protein (g/dL)	3.50	4.26	5.4-7.5
Albumin (g/dL)	1.70	3.05	2.3-3.1
Globulin (g/dL)	1.80	1.21	2.7-4.4
ALT (U/L)	18	42	10-109
ALP (U/L)	343	545	1-114
BUN (mg/dL)	8.00	2.05	8-28
Creatinine (mg/dL)	0.40	0.60	0.5-1.7
Calcium (mg/dL)	10.60	11.98	9.1-11.7
Phosphorous (mg/dL)	8.10	7.04	2.9-5.3
Sodium (meq/L)	147	149	142-152
Potassium (meq/L)	4.10	4.70	3.9-5.1
Chloride (meq/L)	115	118	110-124

non-regenerative anaemia for up to 28 days. The colour of the stools returned to normal 14 days post- treatment (Fig. 2b) and all the haemato-biochemical values returned to normal range 21 days post-treatment.

The lateral flow assay (LFA) based immuno-chromatographic test is reported to have high sensitivity and specificity in case of low parasitaemia (Geromichalou and Faixova, 2017), and could detect present and past ehrlichial infections (Sainz *et al*., 2015). Previously, Checa *et al.* (2024) recorded a high prevalence of CME by LFA (Checa *et al*., 2024). Young dogs less than one year old are commonly reported to be more susceptible than older dogs (Kalaivanan *et al*., 2020), however, in young puppies less than 3 months old, CME was rarely reported (Singh *et al*., 2021).

In this case, haemato-biochemical abnormalities such as anaemia, lymphocytosis, hypoproteinemia,

hypoalbuminemia and hypoglobulinemia were recorded before treatment. On day 14 post-treatment, though a slight increase in the values of RBC, Hb, PCV, total protein and globulin were noticed indicating clinical response to the treatment, these values were still below normal range, except albumin level. In contrast, on day-14 post-treatment, neutropenia and leucocytosis were observed, though these abnormalities were not detected before treatment and this could imply the perpetuation of the ehrlichia within lymphocytes during treatment. Previously, Singh *et al*. (2021) in their study recorded leucocytosis in majority of the dogs affected with CME. Leucocytosis and lymphocytosis with neutropenia or neutrophilia are commonly reported findings in ehrlichiosis, and hence in endemic areas CME is considered as top differential in dogs with persistent lymphocytosis (Mylonakis and Theodorou, 2017), whereas persistent anaemia and thrombocytopenia are reported to be common in subclinical CME (Asawapattanakul *et al.,* 2021).

Hypo-proteinaemia and hypo-albuminaemia observed in this case could be associated with the loss of plasma proteins due to vasculitis or liver disease caused by *E. canis* (Singh *et al*., 2021). Increased serum ALP observed in this case might be due to induced inflammation of the sinusoidal endothelium of liver parenchyma, associated with the proliferation of the pathogen in lymphoid tissues (Angkanaporn *et al*., 2022). However, ehrlichiosis can also induce renal pathological changes resulting in elevated serum BUN and creatinine levels (Angkanaporn *et al*., 2022) and affected dogs are likely to develop multi-organ dysfunction (Kottadamane *et al*., 2017).

In conclusion, detection of ehrlichiosis in dogs at an early stage of clinical phase would help to initiate treatment before entering it in to the fatal mylosuppressive form, which usually fails to respond to the treatment. Early detection of present or past infection could be possible with either PCR or serological tests.

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