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Management of canine distemper, canine babesiosis, helminthiasis in a 6-month-old Nigerian indigenous breed of dogs bitch in Jos - Nigeria

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Abstract A 6-month-old Nigerian indigenous breed of dog bitch was presented to the Small animal clinic of the University of Jos veterinary teaching hospital, Jos, Plateau State, Nigeria, with the complaint of paresis and involuntary movement of the left hindlimb and no vaccination history. On clinical examination, the vital parameters were temperature of 39.4 ^{o}C, pulse rate of 80 beats per minute and respiratory rate of 60 cycles per minute. The clinical signs were congested ocular mucous membranes, bilateral mucoid oculo-nasal discharge, hardened nasal planum, inflamed submandibular lymph nodes (lymphadenopathy), paresis of the hind limbs, hardened footpads, myoclonus of the left hind limbs (distemper myoclonus), fleas on the ventral abdomen, and epilation. Diagnosis was made based on history, clinical signs, lymphopaenia, canine distemper inclusions bodies, and *Babesia canis* on the blood smear. The treatment was symptomatical and supportive. The patient partially recovered 7-days post-therapy as the hind limb myoclonus persisted.

Keywords: multisystemic, digestive, nervous, integumentary, myoclonus, hardpad

1. Introduction

Canine Distemper (CD) is a multisystemic viral disease of dogs and animals of the canine family as well as other carnivores, including large cats (Appel 1987: Headley and Graca 2000). It is highly contagious and caused by the canine distemper virus (CDV) currently known as *Canine morbillivirus*, a member of the genus *Morbillivirus* within the family *Paramyxoviridae* (Murray et al 1995: Anis et al 2018: Rendon-Marin et al 2019), closely related to the viruses which cause Rinderpest, Pestes des petit ruminants (PPR) in ruminants and Measles in humans (Beineke et al 2009).

The disease occurs in a wide range of domestic and wild animal species, and many of these wild animals are known to be reservoirs for maintaining the virus in the canine population through direct or indirect contact with domestic dogs (MacLachlan et al 2011; Martinez-Gutierrez and Ruiz-Saenz 2016). The canine distemper virus can cause disease even in vaccinated animals (SHELL, 1990; Amude et al 2006). Onset of the disease is characterized by diphasic fever, systemic signs affecting the integumentary, gastrointestinal, immune, skeletal, lymphatic, urinary, respiratory, and nervous systems (Lempp et al 2014). Canine distemper is characterized by lymphopaenia, diphasic fever, gastrointestinal and respiratory catarrh, and pneumonic and neurological complications (Mlanga et al 2018).

Clinical signs of canine distemper include a transient fever that usually occurs 3–6 days after infection, with or without leukopenia (especially lymphopenia), usually accompanied by anorexia (Amude et al 2007). The first fever subsides for several days before a second fever occurs (diphasic), which is usually accompanied by serous to mucopurulent oculonasal discharge, lethargy, and anorexia. Gastrointestinal and respiratory signs seen in this disease are typically complicated by secondary bacterial infections. Less frequently, pustular dermatitis may be seen. The occurrence of encephalomyelitis alongside these clinical signs is common, which may follow the systemic manifestations. Dogs that survive the acute phase may have hardened footpads and nasal planum, as well as erupting tooth enamel hypoplasia (Amude et al 2007; Schobesberger et al 2002; Koutinas et al 2004).

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The classic neurological signs seen with this disease include localized involuntary muscle twitching (myoclonus, chorea, flexor spasm, hyperkinesia), convulsions including salivation, and chewing gum fits. Other neurological signs include circling, head tilt, nystagmus, paresis to paralysis, and focal to generalized seizures (Vandevelde et al 2005; Ulrich 2014).

Canine babesiosis is a tick-borne haemoprotozoan disease caused by the large *Babesia canis* and the small *Babesia gibsoni (*Irwin, 2009). The dog population in Jos, Nigeria, is the largest in the country, and dog meat is culturally accepted as a delicacy (Vonkur et al 2022). They are typical intraerythrocytic piroplasms, pear-shaped, found in pairs, and transmitted by *Rhipicephalus sanguineus* in tropical and subtropical countries (S. Sivajothi et al 2014). The disease is characterized by lysis of the red blood cells leading to anaemia (pale mucous membranes), jaundice, depression, tachycardia, tachypnoea, anorexia, weakness, splenomegaly, and fever (Lobetti 2006, Taboada 1998).

Dogs are hosts to a wild spectrum of helminths caused by nematodes, cestodes, and trematodes, of which *Toxocara canis*, *Ancylostoma caninum*, *Dipylidium caninum*, and *Echinococcus* spp. are the most common, and are zoonotic resulting in increased public health risk (Pereira et al 2016). Helminthosis in dogs impede the successful rearing of dogs resulting in losses manifested by lowered resistance to other infectious agents, poor growth, weight loss, reduced work and feed efficiency, general ill health, and sometimes death if untreated (Soulsby 1982). Clinical signs associated with helminthiasis in livestock and companion animals include epilation, weakness, emaciation, restlessness, unthriftiness, diarrhoea, anaemia, dull-rough hair coat, potbelly, decreased stamina or lethargy, coughing, colic, tail rubbing and sometimes intestinal obstruction or perforation (Stoltenow and Purdy 2003; Hiney and Giedt 2017; Ogbein et al 2022).

2. Case presentation

2.1. Case Signalment and History

A 6-month-old Nigerian Indigenous Breed of Dog bitch weighing 9.5kg was presented to the Small Animal Clinic of the University of Jos Veterinary Teaching Hospital, Jos, in February 2021 with the chief complaint of paresis and involuntary spasms (jerking movements) of the hindlimb. History revealed that limping was noticed four days prior to the presentation. The bitch is fed on a homemade meal supplemented with corn and soya bean meal and has neither vaccination record for Canine Distemper, Canine Hepatitis, Canine Leptospirosis, Canine parainfluenza, Canine Parvovirus, or rabies.

2.2. Clinical Findings

On presentation, the vital parameters were temperature of 39.4 ^{o}C, pulse rate of 80 beats per minute, and respiratory rate of 60 cycles per minute (Table 1). The clinical signs noticed were congested ocular mucous membranes, bilateral mucoid oculonasal discharge, hardening of the nasal planum, inflamed submandibular lymph nodes (lymphadenopathy), paresis of the hind limbs, hardening of the footpads (Figure 1 and 2), myoclonus of the left hind limb, fleas on the ventral abdomen and epilation.

Table 1 Patient's Vital Parameters on the day of presentation and subsequent days of treatment.

Parameters	**Patient's Values**					**Reference Values**
Days	**1**	**2**	**3**	**4**	**5**	
Temperature (°C)	39.4	39.2	39.6	39.4	38.8	37.5-39.4
Pulse Rate (beats/minute)	80	76	72	80	84	65-90
Respiratory Rate (cycles/minute)	60	40	32	28	28	15-30

Source: Hassan et al (2003).

2.3. Diagnosis

A tentative diagnosis was made centered on canine distemper and helminthiasis. Blood and Faecal samples were taken for laboratory assessments. A confirmatory diagnosis of canine babesiosis and canine distemper.

2.4. Laboratory results

The Haemogram showed severe neutrophilic leukocytosis with left shift, lymphopaenia, and eosinophilia. The blood smear shows intracytoplasmic inclusion with neutrophils consistent with canine distemper (Figure 3). *Babesia canis* was also seen on the thin blood smear (Figure 4). There was no gastrointestinal parasite found.

2.5. Management plan / Treatment

Administer the antibiotic indicated for use in the case of Gastrointestinal infection, which is common with Canine Distemper: 50mg Gentamicin injection 5mg/kg (0.95ml) intramuscular (IM) x 5/7 once daily (OD). Place the patient on a sedative to help relax Myoclonus and aid recovery: 25mg Chlorpromazine Injection 4mg/kg (1.52ml) IM x 3/7 OD**.** Administer an appetizer that also aids nerve regeneration: 9mg Vitamin B complex Injection 0.9mg/kg (0.95ml) IM x 5/7 OD**,** Use of a non-steroidal anti-inflammatory agent which is also beneficial in nerve regeneration: 25mg Diclofenac Sodium Injection 4mg/kg

(1.52ml) IM x3/7 OD, Place the bitch on ivermectin to handle ectoparasites and take care of intestinal helminths: 10mg Ivermectin Injection 400µg/kg (0.38ml) SC repeat after two weeks, Pour on should be applied to take care of fleas immediately: 2% cypermethrin 5ml.

Figure 1 Hardening the Right hindlimb footpad.

Figure 2 Hardening of the Left Hind limb Footpad.

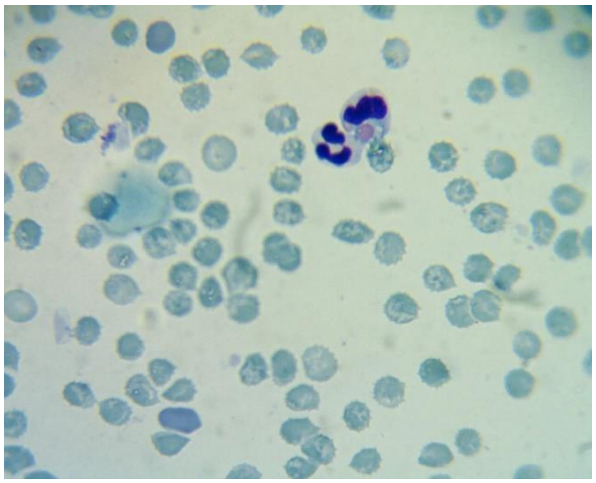

Figure 3 Canine distemper Intracytoplasmic Inclusions.

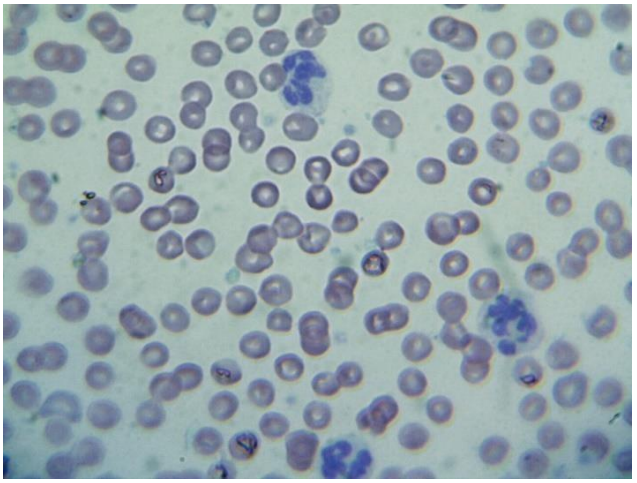

Figure 4 Merozoite of Babesis canis on the blood smear.

3. Discussion

On presentation, the history and clinical signs allude canine distemper and helminthiasis, although there were no ticks, pyrexia, or anaemia pointing towards canine babesiosis. Presence of distemper myoclonus, hardening of the footpads, nasal planum, and lymphopenia in blood reports strongly suggested canine distemper because myoclonus and hardening of footpad are considered as the pathognomonic signs of this disease (Tariq et al 2013). The virus can persist in the footpads and lymphatic cells to cause hyperkeratinization, which is why this disease is also called hard pad disease**.** The only confirmed preventive measure is routine up-to-date vaccination (Tariq et al 2013).

Canine Distemper and helminthiasis were tentatively diagnosed based on the history, and clinical signs, supported by lympophaenia seen on the haemogram and, to a lesser extent, inclusion bodies seen in neutrophils on blood smear, which was indicative of an ongoing viral infection suggested canine distemper. The management plan was to institute therapy immediately, which was targeted at symptomatic and prophylactic treatment as well as to aid nerve regeneration. Upon presentation of the laboratory results, *Babesia canis* was seen on the blood smear, which conferred our diagnosis and treatment towards canine babesiosis. Imidocarb Dipropionate at 5mg/kg B.W was instituted as a treatment for Canine babesiosis. This is due to the fact that disease presents in numerous forms in different animals, and in some animals, the disease may be asymptomatic. As in this case, the dog on presentation had no clinical sign pointing towards Canine Babesiosis, but the disease was present in the animal.

The animal, however, on physical examination, displayed a positive response to treatment within the first 5 days of treatment, but the left hindlimb myoclonus still persisted. Blood sample was also sent to the Pathology Laboratory 7 days post presentation this was done to assess the animal's response to treatment, and all the parameters fell within the normal range (Table 2). This implied that there was a positive response to therapy.

Table 2 Haemogram of the patient.

Parameters	Patient's Values		Reference values
Treatment	Before	After	
HB (g/dL)	14	15	12-18
PCV (%)	44	40	25-55
WBC (x10^3/L)	28.20	16.90	6-17
Segmented Neutrophils (x10^3/L)	21.99 (78%)	9.53 (56%)	3.6-13.1 (60-77%)
Band Neutrophils (x10^3/L)	1.41 (5%)	1.74 (10%)	0-5 (0-29%)
Lymphocytes (x10^3/L)	0.51 (1.82%)	4.60 (27%)	0.72-5.1 (12-30%)
Monocytes (x10^3/L)	0	0	0.18-1.7 (3-10%)
Eosinophils (x10^3/L)	4.29 (15%)	1.03 (6%)	0.12-1.70 (2-10%)
Basophils (x10^3/L)	0	0	Rare
Plasma Proteins (g/dL)	10.4	6.2	5.4-7.9

Note: All values are absolute values with the exception of those parameters, which are relative values in percentages (%) (Robert, 2006).

4. Conclusion

Canine distemper, canine babesiosis, and helminthiasis management, in this case, were centered around the gradual improvement of the patient's whole body condition by boosting the patient's immune system and managing the clinical and laboratory conditions.

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Ethical considerations

Animal handling and procedures followed the guidelines of the ethics committee on the use of animals in experiments. It is pertinent to acknowledge that verbal consent was taken from the clients who presented their dogs at the University of Jos Veterinary Teaching Hospital for sampling.

Conflict of Interest

The authors declare that they have no conflict of interest.

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