

Cardiac Arrhythmia Associated with Canine Distemper

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Canine distemper virus (CDV) is a pantropic morbillivirus responsible for acute and highly infectious viral diseases in both domestic dogs and wild carnivores. As a multisystemic disease, CDV affects various systems, including the respiratory, gastrointestinal, urogenital, ocular and nervous systems. The clinical presentation is highly variable, making diagnosis challenging based solely on symptoms. Clinical signs in affected dogs include catarrhal respiratory and gastrointestinal disorders, alterations of the skin, and central nervous system (CNS) disease (Beineke *et al.*, 2009). The latter most commonly presents as canine distemper virus induced demyelinating leukoencephalitis (CDV-DL). Morphologically, and especially in terms of immunopathological processes, glial responses and evidence of early axonal degeneration, CDV-DL shares certain characteristics with other demyelinating diseases, such as multiple sclerosis (MS) in humans and its experimental animal models (Ulrich *et al.*, 2014). Among the potential clinical signs, vagal nerve involvement, leading to bradycardia, was observed in this case, providing an additional diagnostic consideration for CDV-related complications.

CASE HISTORY AND OBSERVATIONS

A one and half year old Spitz and three years old non-descript dogs (Fig. 1) were presented to Small Animal Medicine Unit, Veterinary Clinical Complex, Orathanadu with the history of dullness, vomiting and diarrhoea. Clinical examination revealed bilateral ocular discharge, corneal ulceration in the left eye, a rough hair coat, and erythematous pustular lesions on the skin. Whole blood samples were collected for haematological and biochemical evaluation to further assess the condition. The haematological parameters revealed low haemoglobin, RBC count, PCV, and leucocytosis. The biochemical parameters showed a decrease amount of total protein and albumin in blood.

General cardiac auscultation revealed abnormalities, prompting further investigation due to the animal's lethargy and dullness. An electrocardiogram (ECG) was performed, revealing atrial fibrillation characterized by the absence of P waves. By the second day, a bradyarrhythmia with continued absence of P waves was observed, indicating significant cardiac involvement in this case.

A lateral flow assay for canine distemper virus (CDV) and canine parvovirus was performed, yielding a positive

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result for CDV (Fig. 2), but negative for CPV as described by Kim *et al.* (2021). The presence of corneal ulceration was confirmed using a fluorescein dye test (Fig. 3). On the day of presentation, electrocardiographic examination showed atrial fibrillation and absence of P wave (Fig. 4). On the second day, an electrocardiogram (ECG) was taken before and after the administration of atropine (0.03 mg/kg)(Fig. 5, 7). The ECG post-atropine revealed the presence of P waves, which were previously absent alongside bradycardia (Fig 6, 8). This finding suggests vagal nerve involvement in this case of canine distemper. Based on these findings, the case was diagnosed as cardiac arrhythmia associated with chronic canine distemper infection.

TREATMENT AND DISCUSSION

The dog was treated intravenously with Inj. Dextrose normal saline 50 mL, Inj. Ringers lactate 50 mL, Inj. Pantoprazole @ 1 mg/kg, and intramuscularly with Inj. Ceftriaxone and tazobactam @ 10 mg/kg, Inj. Hydroxyprogesterone @ 10 mg/kg, and Inj. Vit B1, B6 and B12 0.8 mL for 5 consecutive days. Despite supportive therapy, the prognosis was poor.

Heart diseases in dogs may be acquired or congenital, former being more prevalent. Electrocardiography (ECG) is non-invasive and relatively inexpensive technique which not only records the disturbance in electrical potential, *i.e.*, arrhythmia, rather it also serves as an indicator of electrolyte imbalance, drug toxicity and less precisely myocardial and pericardial affections of heart (Mattera *et al.*, 2012). Therefore routine electrocardiography in conjunction with biochemical



Fig. 1: Dog suspected for Canine Distemper



Fig. 2: Positive for corneal ulceration by fluorescein dye test



Fig. 3: Lateral flow assay - Positive for CDV

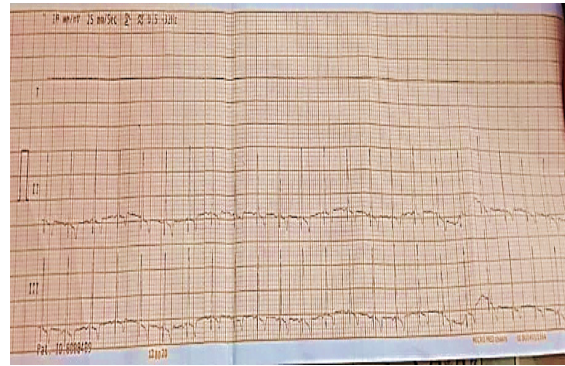


Fig. 4: ECG representing atrial fibrillation and absence of P wave- Day 1

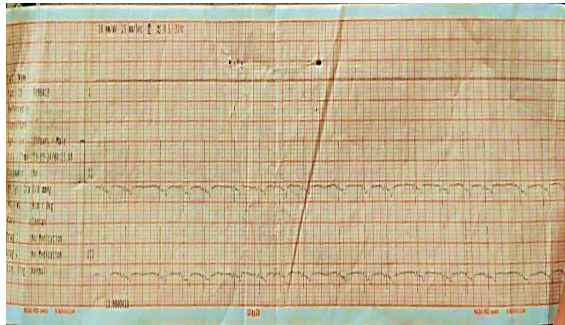


Fig. 5: ECG representing bradycardia – Day 2

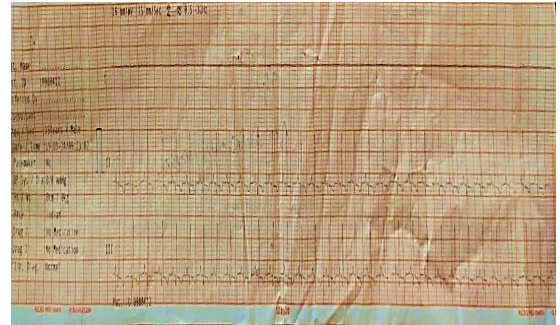


Fig. 6: Normal ECG after Atropine administration

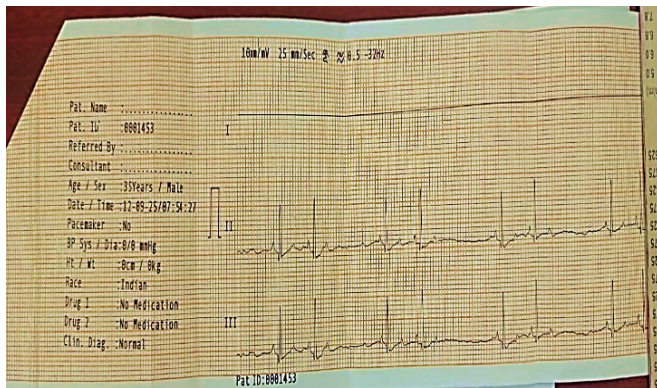


Fig. 7: ECG representing bradycardia

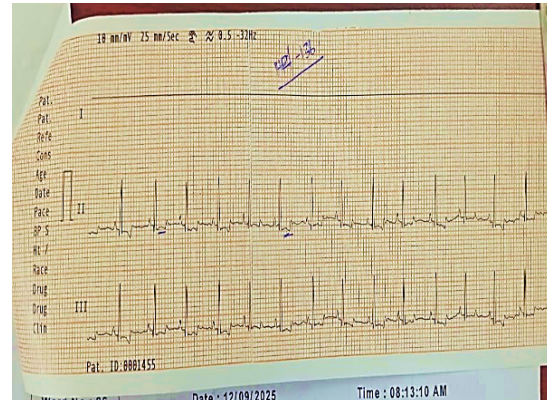


Fig. 8: Normal ECG after Atropine administration

analysis in all the dogs remains the corner stone for possible early diagnosis of the most of cardio-vascular abnormalities (Kumar *et al.*, 2014).

Cardiac arrhythmias in dogs are often associated with primary cardiac disease, electrolyte imbalances or systemic infections. Ventricular arrhythmias commonly occur in dogs with organic heart diseases like degenerative valve disease and dilated cardiomyopathy (Lim, 2022). However, in this case, arrhythmia was linked to vagal nerve involvement secondary to CDV infection. Similar reports are sparse; emphasizing the novelty of this finding. The reappearance of P waves after atropine administration confirmed parasympathetic overactivity mediated through the vagal nerve. This suggests that CDV-induced neuropathic changes can extend beyond the CNS, potentially leading to autonomic dysfunction. Low-dose atropine modestly increases markers of cardiac vagal tone in dogs with healed anterior myocardial infarctions and these increases were greater in dogs that were susceptible than in dogs that were resistant to ventricular fibrillation during exercise plus ischemia (Halliwill *et al.*, 1998). Further, increases in vagal tone after low-dose atropine are sustained in susceptible, but not resistant dogs during exercise without ischemia (Halliwill *et al.*, 1998).

Clinicians should consider cardiac monitoring in suspected CDV cases, particularly when non-specific systemic signs such as lethargy and gastrointestinal disturbances are observed. Early recognition of arrhythmias may improve therapeutic decision-making, though prognosis remains guarded in such complicated presentations. The prognosis of the case was poor. This case gives an insight into the correlation between the vagal nerve damage and canine distemper in a young dog with no history of any other classic neurological signs.

This report describes a rare case of vagal nerve-mediated cardiac arrhythmia associated with CDV infection in a young

dog, in the absence of typical neurological signs. The findings underscore the need to include cardiac monitoring in CDV cases and expand the clinical spectrum of distemper-related complications.

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