Clinical and Diagnostic Studies on Common Causes of Canine Meningeo-Encephalitis in Egypt

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ABSTRACT

Canine meningo-encephalitis triggered many causes, some of them can be distinguished and others are invisible and have a great challenge with small animal clinicians. The present study was conducted to detect the common causes of meningo-encephalitis among dogs that were admitted to the small animal clinic, Faculty of veterinary medicine, Cairo University, Egypt from March to December 2019. About twenty-eight dogs were studied and included thirteen apparently healthy dogs while fifteen dogs suffered from meningo-encephalitis. All dogs subjected to thorough clinical examination. Whole blood and serum samples were taken for evaluation of hematobiochemical changes. In addition, conjunctival and nasal swabs were taken for rapid detection of canine distemper virus infection (CDV) infection. Also, fecal samples were taken for detection of parasitic infection. Results showed that CDV is the most recorded cause for meningo-encephalitis. Other causes were recorded included Toxocara canis, Toxascaris leonina, Babesia canis and head trauma. Physical examination revealed significant increase in both respiration and heart rates in affected dogs. Hematological status revealed significant decrease in RBCs count and relative lymphocytes in affected dogs while there was a significant increase in WBCs count and relative neutrophils. Biochemical status indicated significant decrease in serum albumin and A/G ratio while there was a significant increase in serum activity of aspartate amino transferase (AST) and C-reactive protein (CRP) level among diseased dogs. CDV infection is the most recorded cause for meningo-encephalitis in dogs beside Toxocura spp., Babesia canis and head trauma. Infectious causes have an impact on physical, hematological and biochemical status in affected dogs.

Key words: Meningeo-encephalitis, Dogs, Causes, CDV, Biochemistry

INTRODUCTION

Canine nervous system triggered many inflammatory conditions in veterinary practice. These affections might be viral, bacterial, parasitic, immune mediated or even idiopathic (Bagley, 2005). Some causes included trauma of head and ischemia (Webb and Muir, 2000). Many causes with meningo-encephalitis are of unknown etiology (Lowe et al., 2013) and small animal practitioners are in continuous challenge in the diagnostic approach of this condition as the most of findings are similar irrespective to the actual cause of the clinical picture (Higginbotham et al., 2007). Clinical signs associated meningo-encephalitis included pain at the neck with rigidity, difficulty in manipulation, hyperesthesia, choppy gait, hyperthermia and exercise intolerance (Kis et al., 2008). Clinico and hematobiochemical parameters in cases of meningo-encephalitis are similar in several conditions but the diagnostic step need a synergistic cooperative diagnostic approach to investigate the actual cause (Cornelis et al., 2019). The aim of the present study is the investigation of clinico-laboratory findings in dogs with meningo-encephalitis that admitted to the small animal hospital, faculty of veterinary medicine, Cairo University, Egypt.

MATERIALS AND METHODS

Animals

The present study was conducted on twenty-eight dogs with age range of four months to two years that were admitted to small animal clinic, faculty of veterinary medicine, Cairo University, Egypt from March to December 2019. Studied dogs were divided into fifteen diseased dogs (affected with meningo-encephalitis) and thirteen apparently healthy (control) dogs. Clinical signs were recorded at the time of admission which included...
stiffness of head and neck, seizures, ataxia, tremors, nystagmus, hyperesthesia, vomiting, choppy gait and Chorea. Full clinical examination was carried out including respiration, pulse, and rectal temperature, visible mucous membranes and superficial lymph nodes. Special nervous system examination included neurological reflexes was applied according to (Rijnberk and Stokhof 2009).

Samples
Whole blood samples
About 2 ml whole blood samples were obtained from both healthy and diseased dogs through cephalic vein puncture into vacutainers contain EDTA. These samples for examination of hematological parameters included PCV, Hb, RBCs count, WBCs count and differential leukocytic count with careful examination for the presence of blood parasites.

Serum samples
About 4 ml blood samples with no coagulant were obtained from all animals then left for clotting and centrifuged at 3000 rpm/20 minutes. Serum was separated for investigation of biochemical parameters included total proteins, albumin, aspartate amino transferase (AST), alanine amino transferase (ALT), C-reactive protein (CRP), blood urea nitrogen (BUN) and Creatinine according to specific test kits (Spectrum diagnostics, GmbH, Germany).

Conjunctival and nasal swabs
Conjunctival and nasal swabs were taken from diseased dogs suspected with suspected CDV infection and the rapid antigen test kit was applied according to manufacturer instructions (Quicking Biotech Co. Ltd, Shanghai, China) in the light of historical vaccination data. The presence of two bands indicates positive infection.

Fecal samples
Fecal samples were obtained from all dogs and examined soon at the time of admission grossly for the presence of adult worms and microscopically for any parasitic eggs according to (Zajak and Conboy, 2012).

Statistical analysis
The data was added to Excel sheet and results were recorded as mean±SE. Diseased data were compared with control data by aid of student T- Test. P value ≤0.05 were considered significant.

RESULTS
Regarding the recorded signs in diseased cases, affected dogs showed stiffness of the head and neck, Chorea, seizures, trembling of head and tremors in some cases. Beside nervous signs, some cases showed vomiting with presence of adult round worms in the vomitus which confirmed via adult female worm eggs in stool analysis while there was nasal discharge, dyspnea, vomiting and bloody diarrhea in early stage of CDV infection. Detailed individual data for each diseased dog was recorded and the definite cause for each condition was obtained and scrutinized via confirmatory procedures which vary according to each cause (Table 1). Majority of diseased cases were caused by canine distemper virus infection (CDV) which recorded in seven diseased cases (Fig. 1A and B) and confirmed by positive result of rapid test kits for detection of CDV infection (Fig. 1D). Parasitic infection included Toxocara canis (two cases) and mixed infection of Toxocara canis and Toxascaris leonina was recorded in one diseased case (Fig. 1E). Also, Babesia canis infection was recorded in three cases with history of presence of ticks and confirmed by stained blood film by Giemsa stain (Fig. 1F). Head trauma was recorded as a common cause for meningo-encephalitis in two cases (Fig. 1C). In the light of statistical analysis, results of physical examination showed significant (P≤0.001) increase in both respiration and pulse rates while there was no significant change toward rectal temperature (Table 2).

In terms of hematological parameters (Table 3), results showed significant (P≤0.001) decrease in the level of the RBCs in dogs with meningo-encephalitis compared with apparently healthy dogs while WBCs count showed significant (P≤0.001) increase in diseased dogs. Regarding differential leukocytic count, lymphocytes level showed significant (P≤0.01) decrease in diseased dogs while this significance was for increase in the level of neutrophils compared with healthy dogs. Other hematological results showed non-significant changes between diseased and control groups.
Regarding serum biochemical parameters (Table 4), statistical analysis of the data revealed mild significant (P≤0.05) decrease in the levels of serum albumin and albumin globulin ratio (A/G) among the diseased cases. Results also showed significant (P<0.001) increase in both AST and CRP levels in affected dogs compared with apparently healthy dogs. Other biochemical parameters showed non-significant changes between diseased and healthy dogs.

**DISCUSSION**

The present study was focused on the common causes for meningo-encephalitis in dogs that were admitted to small animal clinic, faculty of veterinary medicine, Cairo University, Egypt. These causes included CDV, Toxocara canis, Toxascaris leonina, Babesia canis and head trauma. CDV infection was the highest recorded cause due to decreased medical awareness about vaccination and endemic nature of the disease in Egypt. This comes in the line with (Tipold, 1995) and (Rakha et al., 2015) who recorded myoclonus neurological signs associated with canine distemper viral infection. Toxocara species infection was another cause for meningo-encephalitis and in the same context; (Rhyoo et al., 2013) detect a larval stage migration to brain causing severe encephalitis. Babesia canis was detected as a common cause of meningo-encephalitis. (Bajer et al., 2013) is in agreement with the present finding as he recorded that Babesia canis and tick born encephalitis were associated neurological signs and may occurred together at the same case. Clinical manifestations associated meningo-encephalitis included chorea, seizures, trembling of head and choppy gait. These signs come in agreement with (Gandini et al., 2003). Also, (Galan et al., 2014) mentioned the most associated clinical signs in dogs with CDV infection that included chorea, ataxia, seizures, paresis and paralysis. (Carvalho et al., 2012) added that CDV can cause severe demyelinating effect on the normal function of oligodendrocytes. The hereinbefore results about physical examination revealed a significant increase of respiration and pulse rates in the diseased group which come in the coincidence with the findings (Zhao et al., 2015).

Referring to the hematological parameters, the present results showed significant decrease in RBCs level in
diseased group that included many cases with CDV infection and this agreed by (Buragohain et al., 2017) who clarify that in cases with CDV infection, hematological alterations occurred due to erythroid hypoplasia and iron sequestration inside bone marrow. Also, explanation of (Gordon et al., 1991) and (Salem, 2014) was due to inflammatory mediators that suppress the process of erythropoiesis. WBCs count showed significant increase in the present results and this finding is in the line with (Kis et al., 2008) who showed that infiltration of peripheral WBCs in neuroparynchyma is occurred during encephalitis. This finding may stimulate the body to increase the production of white blood cells in blood. Regarding the significant neutrophilia in diseased group, (Radaelli and Platt, 2002) prove that neutrophilia is a common finding in cases with bacterial meningitis in dogs. Another significant hematological finding, lymphopenia was recorded among the diseased cases in the present work as many recorded cases were due to CDV infection. (Carvalho et al., 2012) explained the previous result by severe depletion of (CD4-T cells), (CD8-T cells) and (CD2-B cells) categories of lymphocytes from the peripheral circulation toward the sites of inflammation during CDV infection. The hereinbefore data about serum biochemical parameters, results revealed a significant decrease for both albumin level and A/G ratio in affected dogs. These findings suggested as a result of relative increase in the level of globulin in case of inflammation or infection. Results also demonstrated a high significant increase in the aspartate amino transferase activity (AST) and C-reactive protein (CRP) levels among diseased cases. Results of AST come in the same context of (Buragohain et al., 2017) who recorded significant increase of AST due to multisystem involvement in dogs suffered from CDV infection. Regarding CRP findings, (Schwartz-Porsche, 1994) and (Knowles, 1998) agreed with the present study results as they recorded a high serum CRP in cases with generalized seizures in dogs. On the other hand (Nakamura et al., 2008) recorded no change and explain his result by prolonged time of sampling after seizure episode. In the same context, (Segers et al., 2017) recorded low CRP level in cases with canine idiopathic epilepsy when compared with control healthy group. This may be due to the specific causative agent that not included severe infection or inflammation.

Conclusions
From the hereinbefore data, it can be concluded that most recorded causes of meningo-encephalitis among dogs that were admitted to small animal clinic, faculty of veterinary medicine, Cairo University, Egypt included CDV, Toxocara canis, Toxascaris leonina, Babesia canis and head trauma. Infectious causes possess great impact on physical and hematobiochemical status. Further studies needed to estimate the accurate prevalence of each cause especially at other private clinics in different governorates of Egypt.

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