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Echocardiography as prognostic indicator in Canine Parvovirus affected dogs: A prospective study

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Abstract

Canine Parvovirus Enteritis (CPE) has become an important problem to dog population with an inadequate immunization to parvovirus during the first year of life is an important risk factor for the disease. Clinically, the disease manifests either as enteric or cardiac form. The cardiac form is only seen in neonates infected in utero. In 2–3-week old seronegative pups, CPV is also able to replicate in cardiac cells inducing a fatal myocarditis. A study was conducted to identify the cardiac involvement in parvovirus affected dogs and the results are discussed below.

Keywords: Echocardiography, parvovirus, cardiac form

1. Introduction

Canine parvovirus Enteritis (CPE) is often fatal disease caused by strains of CPV-2 (2, 2a, 2b, and 2c) (Greene, 2012) [3]. Most affected dogs are under 6 month of age. Ten to twelve weeks of age are particularly vulnerable due to the waning protective effect of maternally derived antibodies or due to failure of vaccination (Greene and Decaro, 2012) [4]. Ware (2007) [9] stated that a syndrome of parvoviral myocarditis was widely recognized 25–30 years ago, although it is uncommon today, probably as a result of maternal antibody production. He also opined that Parvovirus was suspected to cause a form of dilated cardio myopathy (DCM) in young dogs that survive neonatal infection.

Echocardiography revealed abnormalities consistent with DCM, including decreased fractional shortening, left atrial and ventricular enlargement, and increased E-point septal separation (Smith *et al.*, 2008) [8].

Atwell and Kelly (1980) [1]; Ilgen and Conroy (1982) [6] reported that the cause of most dilated cardiomyopathies in animals remains unknown, but several potential underlying causes are being studied which include carnitine deficiencies, metabolic abnormalities including hypothyroidism, and myocarditis induced by canine parvovirus.

Methods and Materials

Pet dogs, irrespective of breed, age and sex presented with history of acute vomiting and diarrhea with blood and positive for CPV by PCR were taken up for the study. Dogs that turned positive for CPV was supported with a standard treatment protocol.

Dogs recorded with abnormal ECG pattern and with a heart rate more than 160 bpm was subjected for echocardiography using curvilinear mechanical transducer as per the standard imaging protocol described by Boon (2011) [2] (Fig.1).

Result

Fraction Shortening

The minimum value of the Fraction shortening (FS) in CPE affected dogs (N=12) having heart rate of more than 160 bpm was 19 and maximum was 78 and the mean $\pm$ SE was 40.33 ± 5.5 . Whereas as in control group (N=6) the mean $\pm$ SE value of FS was 35.25 ± 2.976 (Table -1).

The fraction shortening was significantly ($p=0.0453$) differ between the diseased and control group.

Ejection fraction: The minimum and maximum values of the Ejection fraction (EF) in disease affected dogs ($N=12$) was 47.2 and 99 respectively, the mean value was 76.18 ± 5.563 . Whereas in control group the minimum and maximum values 64 and 86.6 respectively, the mean value was 72.05 ± 3.302 (Table-1). The EF values are not statistically significant.

E-point Septal Separation (EPSS): In the present study the mean $\pm$ SE of EPSS in the control dogs was 3.067 ± 0.446 mm and diseased dogs was 4.233 ± 0.297 mm. However, no significant difference was observed between the EPSS of the control group, dogs that infected with CPV.

Table 1: Echocardiographic values of CPE affected dogs same superscript with in a row differ significantly ($p<0.05$)

Parameter	Level	Control (N=6)	Diseased (N=12)
Ejection fraction (%)	Min.	64	47.2
	Max.	86.6	99
	Mean $\pm$ SE	72.05 ± 3.302	76.18 ± 5.563
Fraction shortening (%)	Min.	28.8	19
	Max.	48.9	78
	Mean $\pm$ SE	35.25 ± 2.976^a	0.33 ± 5.519^a
EPSS (mm)	Mean $\pm$ SE	3.067 ± 0.446	4.233 ± 0.297

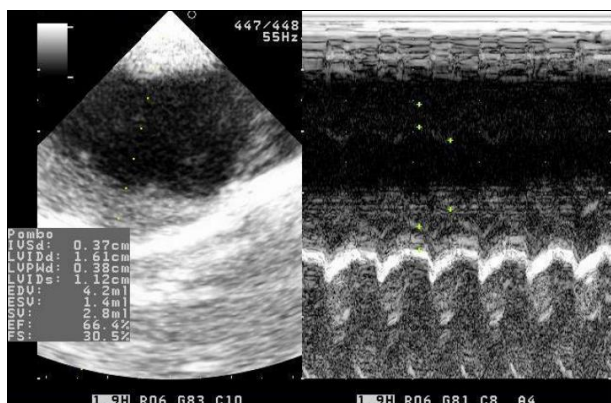


Fig 1: M – mode echocardiography

Discussion:

In the present study the Ejection fraction and fraction shortening in the control and Canine Parvovirus (CPV) infected dog showed normal values. Further E-point to septal separation (EPSS) was also normal in CPV infected dogs when compared with the control mean. Usually, parvovirus myocarditis causes sudden death or pulmonary edema in 4 to 10 week old puppies as reported by Hezel *et al.* (1979) [5] and Mulvey *et al.* (1980) [7]. Although, normal echocardiographic findings were reported in the present study, there are fair chances for the development of heart ailment which can progress to congestive heart failure as age advances (Atwell and Kelly, 1980) [1].

Conclusion:

Based on the above study it is concluded that Echocardiography was not useful in predicting the prognosis of the parvovirus affected dogs.

Conflict of Interest

Not available

Financial Support

Not available

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