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Prognostic findings in dogs with dilated cardiomyopathy

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Abstract

Dogs presented with clinical signs suggestive of cardiac insufficiency were screened for the DCM. Detailed clinical examination, physical examination, haematology, serum biochemistry, thoracic radiography, electrocardiography and echocardiography were carried out to confirm the DCM. Prognostic findings were noted in 26 dogs with DCM. The unfavourable prognostic indicators observed in DCM dogs included aged dogs above 8 years, weight loss, open mouth breathing, orthopnoea, syncope, tachycardia, ascites, high serum creatinine, atrial fibrillation, ventricular tachycardia, pulmonary odema, pleural effusion, fractional shortening below 10 percent, ejection fraction below 25 percent and restrictive transmitral flow pattern.

Keywords: dilated cardiomyopathy, dogs, prognosis, survival

Introduction

The Dilated Cardiomyopathy (DCM) in dogs is a condition of unknown etiology characterised by chamber dilation and myocardial systolic and diastolic dysfunction of one (usually the left) or both ventricles. Generally, DCM is a disease of large and medium sized dogs. It is an adult-onset disease, with the exception of the Portuguese Water Dogs in which the young are affected (2 to 32 weeks old). The rate of progression of DCM is not known. The symptomatic phase is preceded by an asymptomatic phase where several compensatory mechanisms act in concert to maintain cardiac output and prevent congestive heart failure (CHF) (Sisson *et al.*, 2000) [9]. In dogs with DCM, the most common clinical manifestations are: cough, laboured breathing, exercise intolerance, weakness, reduced appetite, mucosal pallor, weight loss and collapse. In DCM, the prognosis is usually grave and often sudden death may occur before the development of disease. With the increasing awareness and diagnosis of DCM in general practice, providing an accurate prognosis is important. Hence, improved understanding and awareness of the clinical variables that relate to a poor prognosis may help to identify dogs that require intensive monitoring (Martin *et al.*, 2010) [5]. Keeping in view the above facts, the study was designed to identify the survival and prognostic findings in dogs with DCM.

Materials and Methods

The study included control group and clinical cases with DCM. Among the different cases presented to the small animal medicine ward at Department of Teaching Veterinary Clinical Complex, a total of ten apparently healthy dogs of large to giant sized breeds aged above five years brought for routine health check up, vaccination and deworming were randomly selected for the study and kept under the control group. In the present study, clinical cases included the dogs presented with clinical signs suggestive of cardiac insufficiency and they were screened for the DCM using the specially designed cardiology data sheet. They were subjected to detailed clinical examination, physical examination, haematology, serum biochemistry, thoracic radiography, electrocardiography and screened for the presence of canine heartworm infection. Furthermore, M-mode and Doppler echocardiography were carried out to confirm the DCM and to quantify the left ventricle dysfunctioning. For the identification of prognostic indicators, the endpoints were defined as death or euthanasia for reasons related to heart disease. Cases which died or euthanised for non-cardiac reasons, or which were lost to follow-up or which were still alive at the end of the study, were excluded (Martin *et al.*, 2010) [5]. The association of clinical, radiographic, electrocardiographic and echocardiographic variables with the prognosis were recorded.

Results and Discussion

In the present study, out of twenty six dogs with DCM, 9 dogs died during the study period, 12 dogs were alive at the end of the study period and 5 dogs follow up was lost. Most of the dogs were died during the first two months of study which was in accordance with the findings of Monnet *et al.* (1995) [6]. The unfavourable prognostic indicators in DCM dogs (Table.1) noticed in the present study were: signalment of dogs aged above 8 years: clinical signs of weight loss (Figure.1), open mouth breathing, orthopnoea and syncope;

tachycardia and ascites (Figure.2) on physical examination; high serum creatinine on serum biochemical profile; atrial fibrillation and ventricular tachycardia on electrocardiogram; pulmonary odema and pleural effusion (Figure.3) on thoracic radiography; fractional shortening below 10 percent and ejection fraction below 25 percent on M-mode echocardiography (Figure.4) and restrictive transmitral flow pattern on pulsed wave Doppler echocardiography (Figure. 5).

Table I: The unfavourable prognostic indicators in dogs with DCM

S. No	Parameter	Variable
1	Signalment	Age (> 8 years)
2	Clinical signs	Weight loss
		Open mouth breathing
		Orthopnoea
		Syncope
3	Physical examination findings	Tachycardia
		Ascites
4	Serum biochemical profile	High serumcreatinine
5	Electrocardiogram	Atrial fibrillation
		Ventricular tachycardia
6	Thoracic radiography	Pulmonary odema
		Pleural effusion
7	M-mode echocardiography	Fractional shortening below 10 percent
		Ejection fraction below 25 percent
8	Pulsed wave Doppler echocardiography	Restrictive transmitral flow pattern



Fig 1: Weight loss in dogs with DCM



Fig 2: Ascites in dogs with DCM

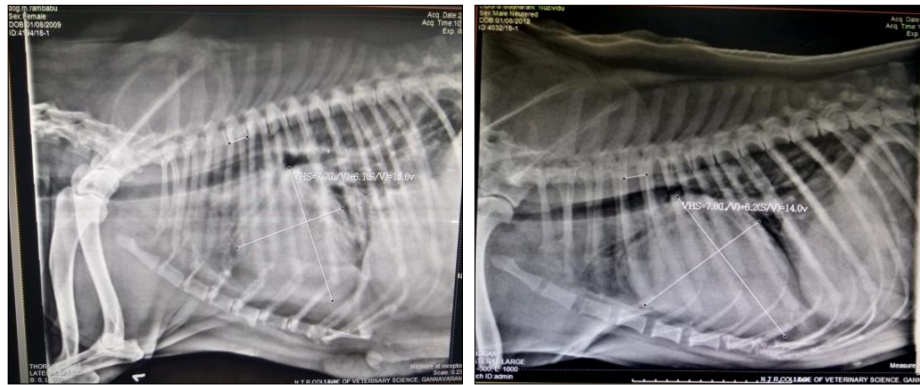


Fig 3: Pulmonary edema and pleural effusion in dogs with DCM

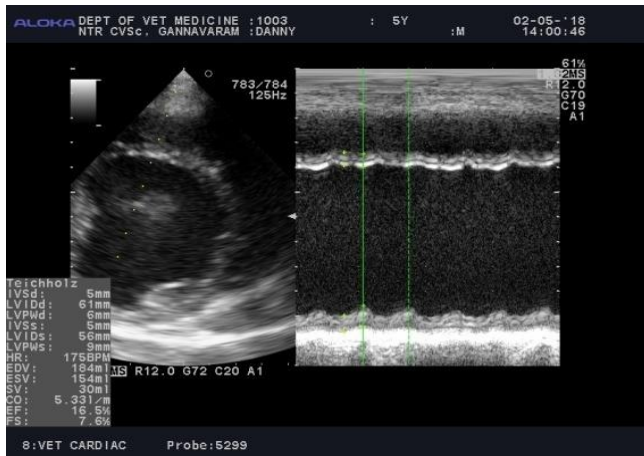


Fig 4: Fractional shortening below 10 percent in dog with DCM



Fig 5: Restrictive TMF pattern in dog with DCM

The present findings were supported by the earlier observations (Monnet *et al.*, 1995; Calvert *et al.*, 1997; Borgarelli *et al.*, 2006; Martin *et al.*, 2010; Palermo *et al.*, 2011; Pedro *et al.*, 2011 and Kluser *et al.*, 2016) [6, 3, 1, 5, 7, 8, 4]. The prognosis for dogs with DCM is generally guarded to poor. Historically, most dogs do not survive longer than 3 months after the clinical manifestations of CHF, although approximately 25% to 40% of affected dogs live longer than 6 months if initial response to therapy is good (Ware, 2009). Tidholm and Johnsson (1997) [10] found that dogs less than five years old at presentation had a poorer survival than those greater than five years, while Monnet *et al.* (1995) [6] and Borgarelli *et al.* (2006) [1] found no correlation with age. Significant heart rate might be due to sympathetic system activation which would be consistent with signs of heart

failure (Palermo *et al.*, 2011) [7]. Tidholm and Johnsson (1997) [10] found that dyspnoea and ascites correlated with survival, whereas Borgarelli *et al.* (2006) [1] also found ascites to be one of the few parameters that was associated with a poor survival. The presence of syncope in dogs with myocardial dysfunction was associated with a poor prognosis (Palermo *et al.*, 2011) [7]. High serum creatinine indicating concurrent renal insufficiency may have been present in many dogs and could be an independent risk factor for mortality (Martin *et al.*, 2010) [5]. In dogs with DCM, atrial fibrillation was associated with greater than 50% mortality during the first 2 weeks (Calvert *et al.*, 1997) [3]. The onset of atrial fibrillation or ascites during the course of therapy correlated with clinical deterioration, reflecting more severe cardiac dysfunction and the subsequent survival time was usually short (Calvert *et al.*, 1997) [3]. However, this study also suggested that dogs that survive more than 7 months have a good probability of becoming long-term survivors, with some living as long as 40 months after the diagnosis. The dogs presenting with the pulmonary edema which may be a sign of advanced DCM, has been suggested to indicate a poor prognosis in DCM (Calvert and Brow., 1986) [2]. Pleural effusion, identified by thoracic radiography, was the most significant prognostic indicator of survival which was most likely to occur when systemic interstitial pressures are elevated and in dogs with biventricular CHF as suggested by Monnet *et al.* (1995) [6]. In the present study, DCM dogs with ejection fraction of less than 25 percent had significantly shorter survival time which was supported by Palermo *et al.* (2011) [7]. Diastolic dysfunction plays an important role in predicting cardiac mortality. The DCM is a progressive disease and changes of transmitral flow (TMF) reflect changes of diastolic function (Borgarelli *et al.*, 2006) [1]. Mitral E-wave deceleration time (Edt) reflects time of pressure equilibration between left atrium and ventricle after early diastole. In DCM at the time the filling pressure increases, the decreased compliance of the ventricle induces a more rapid increase in diastolic pressure with a faster equilibration of left atrial and left ventricle pressure, resulting in rapid cessation of (TMF) and short Edt of rapid filling. A restrictive TMF pattern with shortened Edt appears to be a useful prognostic predictor in dogs with DCM (Borgarelli *et al.*, 2006) [1].

Conclusion

From the above findings of the present study, it was concluded that the clinical, radiographic, electrocardiographic and echocardiographic variables associated with the survival and prognosis in dogs with DCM were: age of dogs above eight years, weight loss, open mouth breathing, orthopnoea,

syncope orthopnoea, syncope, tachycardia, ascites, high serum creatinine, atrial fibrillation, ventricular tachycardia, pulmonary odema, pleural effusion, fractional shortening below 10 percent, ejection fraction below 25 percent and restrictive transmitral flow pattern.

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