The Pharma Innovation Journal 2021; SP-10(11): 2493-2495

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; SP-10(11): 2493-2495

www.thepharmajournal.com
Received: 16-09-2021
Accepted: 18-10-2021

Basava Reddy K
Department of Veterinary Medicine, Veterinary College, Hebbal, KVAFSU, Karnataka, India

Ansar Kamran C
Department of Veterinary Medicine, Veterinary College, Hebbal, KVAFSU, Karnataka, India

Ramesh PT
Department of Veterinary Medicine, Veterinary College, Hebbal, KVAFSU, Karnataka, India

Upendra HA
Department of Veterinary Medicine, Veterinary College, Hebbal, KVAFSU, Karnataka, India

Suguna Rao
Department of Veterinary Pathology, Veterinary College, KVAFSU, Karnataka, India

Mahesh V
Department of Veterinary Surgery and Radiology, Veterinary College, KVAFSU, Karnataka, India

Corresponding Author
Basava Reddy K
Department of Veterinary Medicine, Veterinary College, Hebbal, KVAFSU, Karnataka, India

Prognostic indicators in dogs with secondary pulmonary hypertension due to dilated cardiomyopathy

Basava Reddy K, Ansar Kamran C, Ramesh PT, Upendra HA, Suguna Rao and Mahesh V

Abstract
Pulmonary hypertension being commonly diagnosed as secondary to an underlying cardiac disease. Better understanding of unfavourable prognostic indicators associated with pulmonary hypertension and its underlying disease helpful in management of cardiac patients and improve the quality of life. In the present study, among 165 dogs screened for cardiac disorders, 61 dogs (36.96%) were diagnosed with DCM out of which, ten (16.39%) dogs had mild (PAP=30-55 mm Hg) pulmonary arterial hypertension. Dogs with secondary pulmonary hypertension due to DCM had significantly higher LA/Ao ratio and elevated valvular regurgitation velocity compared to DCM dogs without pulmonary hypertension. In the present study, the unfavourable prognostic indicators in dogs with secondary pulmonary hypertension due to DCM were exercise intolerance, atrial fibrillation in ECG, pulmonary oedema and pulmonary artery dilatation on thoracic radiography; septal flattening, right ventricular dysfunction, decreased RPAD index, increased valvular regurgitation and pulmonary arterial pressure on echocardiography. In the present study DCM dogs with pulmonary hypertension had poor survival time than without pulmonary hypertension.

Keywords: dogs, DCM, pulmonary hypertension, prognosis

Introduction
Pulmonary arterial hypertension (PAH) is a complex syndrome that has grave prognosis associated with cardiac diseases in dogs. PAH may be primary (idiopathic) or secondary to pulmonary or cardiovascular system abnormalities. Left side congestive heart failure due to elevated post-capillary pressure is a common cause of PAH in dogs (Kellihan and Stepien 2010) [7]. The major clinical findings observed in dogs with pulmonary hypertension were cough, dyspnea, tachypnea, wheezing, exercise intolerance or exertional weakness or collapse (Bonagura and Twedt, 2009) [3]. The echo Doppler diagnosis of PAH has now largely replaced an invasive method (right heart catheterization) used earlier to measure pulmonary arterial pressure in dogs (Chetboul 2016) [6]. Because most cases of pulmonary hypertension were secondary to an underlying disease process, treatment aimed at eliminating or improving the underlying disease status was the basis for therapy. Better understanding of unfavourable prognostic indicators associated with pulmonary hypertension and its underlying disease helpful in management of cardiac patients and improve the quality of life.

Material and Methods
The study was carried out among the dogs (n=165) presented with clinical signs suggestive of cardiac insufficiency were screened for the DCM with pulmonary hypertension using the specially designed cardiology data sheet. They were subjected to detailed clinical examination, physical examination and special examination including echocardiography. Furthermore, dogs were subjected to two-dimensional, M-mode, colour flow doppler, PWD and continuous wave doppler echocardiography as described by Boon (2011) [4] to diagnose the dilated cardiomyopathy with pulmonary hypertension. The dogs that had fractional shortening below twenty five percent, ejection fraction below fifty percent with left atrial enlargement and evidence of tricuspid valve regurgitation on color Doppler were included in the study.
Dogs were excluded if they had congenital cardiac diseases or acquired heart diseases like bacterial myocarditis or myxomatous mitral valve degeneration. None of the dogs were given sedation or tranquilization while performing echocardiography.

Results and Discussion

In the present study, among 165 dogs screened for cardiac disorders, 61 dogs (36.96%) were diagnosed with DCM out of which, ten (16.39%) dogs had mild (PAP=30-55 mm Hg) pulmonary arterial hypertension. Pyle *et al*. (2004) [11] also reported mild pulmonary arterial hypertension in DCM dogs. Dilated cardiomyopathy dogs (n=30) without pulmonary hypertension were treated with pimobendan, digoxin, enalapril and furosemide. The remaining 21 dogs follow up could not be ascertained due to lack of response from the owners. Dogs with secondary pulmonary hypertension due to DCM had significantly higher LA/Ao ratio and elevated valvular regurgitation velocity compared to DCM dogs without pulmonary hypertension. More mitral regurgitation and higher left atrial pressure have increased risk of developing secondary pulmonary hypertension in animals and humans (Borgarelli *et al.*, 2015) [1]. The unfavourable prognostic indicators in dilated cardiomyopathy dogs were dogs aged above 8 years, clinical signs of open mouth breathing, orthopnoea, tachycardia; pulmonary crackles and ascites on physical examination; high serum creatinine (>2mg/dl) on serum biochemical profile; atrial flutter and atrial fibrillation on electrocardiogram; pulmonary oedema and pleural effusion on thoracic radiography; fractional shortening below 10 percent and ejection fraction below 25 percent on M-mode echocardiography and restrictive transmitral flow pattern characterised by tall E wave and short E wave deceleration time (Edt) on pulsed wave Doppler echocardiography. The present findings were supported by the earlier observations (Martin *et al*., 2010; Pedro *et al*., 2011and Kluser *et al*., 2016) [9, 10, 8]. High serum creatinine indicating concurrent renal insufficiency in dogs with congestive heart failure and could be an independent risk factor for mortality (Martin *et al*., 2010) [9]. The dogs with pulmonary edema may be a sign of advanced DCM and indicate a poor prognosis in DCM dogs (Calvert and Brown, 1986). The DCM dogs without atrial fibrillation can survive longer than with atrial fibrillation (Borgarelli *et al.*, 2006) [2]. A short deceleration time of mitral E wave (Edt<80 ms) was better negative prognostic value than other echocardiographic indices (Chetboul, 2016) [6]. The absence of mitral A wave (peak late diastolic filling wave) and decreased Edt (<80ms) had negative prognostic value and decreased the survival time due to loss of ventricular compliance (Reddy *et al*., 2021) [12].

The unfavourable prognostic indicators in dogs with secondary pulmonary hypertension due to DCM were exercise intolerance, atrial fibrillation in ECG, pulmonary oedema and pulmonary artery dilatation on thoracic radiography; septal flattening, right ventricular dysfunction, decreased right pulmonary artery distensibility index (RPAD index), increased valvular regurgitation and elevated pulmonary arterial pressure on echocardiography. The prognosis for dogs with DCM and pulmonary hypertension is generally guarded to poor. In the present study DCM dogs with pulmonary hypertension had poor survival time (284.67 ± 21.13 days) than without pulmonary hypertension (375 ± 14.25 days). The presence of pulmonary hypertension is associated with increased risk of death in dogs with cardiac failure (Borgarelli *et al.*, 2015) [1]. The poor prognostic indicators in human patients with DCM were age, exercise capacity, left ventricular EF and pulmonary arterial hypertension (Xie *et al*., 1994) [13]. The survival time were significantly shorter in dogs with RPAD index ≤24% and could predict the clinical outcome in dogs with pulmonary hypertension caused by various diseases (Chan *et al*., 2019) [7].

Table I: The unfavourable prognostic indicators in DCM dogs and dogs with secondary pulmonary hypertension due to DCM

Parameter	DCM dogs	Secondary pulmonary hypertension
Signalment	**Age > 8years**	**Age > 8years**
Clinical signs	Open mouth breathing, orthopnoea, tachycardia	Exercise intolerance, orthopnoea
Physical examination findings	Pulmonary crackles and ascites	Pulmonary crackles and ascites
Serum biochemical profile	High serum creatinine (>2mg/dl)	-
Electrocardiogram	Atrial flutter and atrial fibrillation	Atrial fibrillation
M-mode echocardiography	Decreased fractional shortening (FS<10%) Decreased ejection fraction (EF<25%)	Septal flattening, decreased RPAD index, Higher LA/Ao ratio
Doppler echocardiography	Tall E wave and short Edt on pulsed wave Doppler	Valvular regurgitation and elevated pulmonary arterial pressure

References

1. Borgarelli M, Abbott J, Bruz-Ruivo L, Chiavegato D, Crosara S, Lamb K *et al*. Prevalence and prognostic importance of pulmonary hypertension in dogs with myxomatous mitral valve disease. J Vet. Internal Med 2015;29:569-574.
2. Borgarelli M, Santilli RA, Chiavegato D, D'Agnolo G, Zanatta R, Mannelli A *et al*. Prognostic indicators for dogs with dilated cardiomyopathy. J Vet. Inter. Med. 2006;20:104-110.
3. Bonagura JD, Twedt DC. Pulmonary hypertension: In Kirk's Current veterinary therapy XIV. Saunders Elsevier, Missouri 2009, 697-698.
4. Boon JA. Veterinary echocardiography. Second edn. Willey-Blackwell. Ames, Iowa, United states of America 2011.
5. Chan IP, Weng MC, Hsueh T, Lin YC, Lin SL. Prognostic value of right pulmonary artery distensibility in dogs with pulmonary hypertension. Journal of Veterinary Science 2019;20(4):e34
6. Chetboul V. Dilated cardiomyopathy and other cardiomyopathies in dogs – Clinical echocardiography of the dog and cat: Elsevier, Missouri 2016, 182-194
7. Kellihan HB, Stepien RL. Pulmonary hypertension in dogs: Diagnosis and therapy. Vet. Clin. Small Anim. 2010;40:623-641.
8. Klüser L, Holler PJ, Simak J, Tater G, Smets P, Rügamer D *et al*. Predictors of sudden cardiac death in Doberman Pinschers with dilated cardiomyopathy. J Vet. Inter. Med. 2016;30(3):722-732.
9. Martin MW, Stafford Johnson MJ, Strehlau G, King JN. Canine dilated cardiomyopathy: a retrospective study of prognostic findings in 367 clinical cases. J small anim. Pract 2010;51(8):428-436.
10. Pedro BM, Alves JV, Cripps PJ, Johnson MJ, Martin MW. Association of QRS duration and survival in dogs with dilated cardiomyopathy: a retrospective study of 266 clinical cases. J Vet. Cardiol. 2011;13(4):243-249.

11. Pyle RL, Abbott J, Maclean H. Pulmonary hypertension and cardiovascular sequelae in 54 dogs. Int. J Appl. Res. Vet. Med 2004;2(2):99-109.
12. Reddy BK, Kamran AC, Upendra HA, Rao S, Mahesh V. Pulsed wave doppler echocardiographic evaluation and management of atrial fibrillation in dogs with dilated cardiomyopathy. J Anim. Res 2021;11(4):643-648.
13. Xie Cong-Yaun, Berk MR, Smith MD. Prognostic value of Doppler trans mitral flow patterns in patients with congestive heart failure. J Am Coll Cardiol 1994;24:132-139.