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Diagnostic aspects of certain cardiac disorders in canines

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Abstract
There is growing recognition in canine cardiac disorders, which causes significant morbidity and mortality. Diagnosis of heart failure involves careful history taking, physical examination, thoracic radiography, echocardiography, electrocardiography, and blood pressure measurement add to the diagnostic database but often are not required to achieve a working diagnosis and to formulate an initial treatment plan. However, there is continued controversy surrounding the diagnostic criteria for heart failure/ cardiac disorders. As a result, clinical therapeutic trials have been slow to develop. This article focuses on diagnostics aspects of certain canine cardiac disorders.

Keywords: Diagnosis, canine, cardiac disorders, ecg, echocardiography

Introduction
Heart disease is a major health problem and silent killer in pets. The clinical presentation is often spectacular and therapy demands some snap decisions based on solid theoretical knowledge. Over recent decades, the diagnostic techniques at our disposal have improved and proliferated and we are able to confidently diagnose the disease earlier in its course. Holter electrocardiography and echocardiography have become standard "screening" techniques and the prevalence and natural history of the disease are increasingly well understood (Wess *et al*. 2010) [19]. More recently, the potential for circulating concentrations of biomarkers to help identify these dogs has also been demonstrated (Singletary *et al*. 2012) [17]. One of the hopes inevitably raised with earlier diagnosis of a condition is that this will lead to an improved ability to treat the disease and an improved outcome for patients that participate in screening studies. Ideally, intervention before the patient is showing signs should allow the onset of signs to be delayed (or prevented altogether) and through slowing the progression of the disease, the patient should live longer.

Materials and Methods
Dogs of various breed, age and sex presented and referred from various hospitals in and around Hyderabad to Teaching Veterinary Clinical Complex, Bhoiguda and Campus Veterinary Hospital, Rajendranagar with the history and few/ all of clinical signs suggestive of cardiac involvement such as cough, ascites, peripheral / general edema, exercise intolerance, generalized weakness, dyspnoea at rest were considered for the present study. These cases were subjected for detailed clinical examination and later for specific diagnostic procedures to confirm the cardiac disorder.
Blood was collected in duplicate (both for whole blood and serum) from the peripheral (cephalic/ saphenous) veins of dogs suffering with cardiac problem. The sampling was done on day 0 (before therapy), 30, 60 (during therapy) and 90 (after therapy). However, blood was also collected from apparently healthy dogs to establish normal values.

Hematology
Hemoglobin (Hb), Packed cell volume (PCV), Total erythrocyte count (TEC), Total Leukocyte count (TLC) and Differential leukocyte count (DLC) were estimated as per the procedure described by Schalm *et al*. (1986) [14].

Serum biochemistry

Creatine Kinase MB (CKMB), Lactate Dehydrogenase (LDH), Alanine Amino Transferase (ALT), Total Serum Protein (TP), Serum Albumin (Alb), Blood Urea Nitrogen (BUN), Serum Creatinine (Cr), Serum Sodium (Na), Serum Potassium (K), Serum Chloride (Cl) were estimated using semi automatic biochemical analyzer and commercially available diagnostic kits as per the procedure furnished in kits.

Diagnostic imaging techniques

Electrocardiography, radiography and echocardiography were carried out to diagnose the cardiac disorders. The ECG was recorded on right lateral recumbency on a non-conducting top table. However, in patients with severe respiratory distress, ECG was recorded in standing position. Based on the results of physical examination and ECG findings the dogs with cardiac disorders were subjected to left lateral and dorsoventral thoracic exposure and the radiographs were analyzed for abnormality. B- mode Echocardiography, a two dimensional technique was employed, which uses a very narrow ultrasound beams images a small portion of the heart and detect only the axial motion of structures. Transthoracic echocardiograms were obtained with the unsedated dogs in right lateral recumbency. M-Mode recordings were taken at the high papillary level. Measurement of Left entricular Dimension at End- Diastole (LVEDd) and End – Systole (LVEDs) was made intraluminally from the trailing edge of the septal wall image to the leading edge of the left ventricular free wall. End-diastolic and End-systolic measurements of the thickness of the Inter Ventricular Septum (IVSd, IVSs) and Left Ventricular Posterior Wall (LVPWd, LVPWs) were made using the trailing edge to leading edge (Allworth *et al*., 1995) [3]. Further Ejection Fraction (EF) and Fractional Shortening (FS) were also calculated. E – point septal separation was measured from the point of maximal cranial motion of the cranial mitral valve leaflet (E point) to the interventricular septum during the rapid – filling phase of diastole. All the measurements were made in millimetres. Further, Pulse wave Doppler and Colour flow Doppler studies were also attempted in order to assess the mitral valve insufficiency and regurgitation as per the technique suggested by Dominique and Marc-Andre (2008) [5]. The cardiograms were compared with the healthy dogs for conclusion.

Discussion

Hematology

The mean values of various blood parameters of dogs with cardiac disorders may be within the normal range. However, Reece William (2004) [12] and Sesh *et al*. (2013) [15] suggested that decrease in Hb, PCV and TEC was due to ischemia indicating cardiovascular disorder. Boghian (2012) [4] reported anemia, leukocytosis with neutrophilia in dogs with chronic congestive cardiac insufficiency. Ristic (2004) [13] suggested that, though the hematology was not particularly helpful to diagnose, but it could be used to investigate potential concurrent diseases.

Serum-biochemistry

The mean biochemical parameters may also be within the normal range, though significantly elevated levels of CKMB, LDH and significantly (<0.05) low levels of total protein, albumin, sodium and potassium may be recorded in few case. Joanna *et al*. (2003) [9] and Singh *et al*. (2012) [16] who were of the opinion that in CHF patients routine biochemical parameters may remain within the normal range except for an elevation in the levels of lactate dehydrogenase and creatine kinase MB. Mild hypoproteinemia and hypoalbuminemia in the affected dogs could be attributed to increased protein loss from the intestines due to bowel and pancreatic edema and poor absorption due to decreased splanchnic perfusion or it is usually ascribed to high levels of vasopressin causing water retention (Paul Wotton, 2010) [11]. Low levels of sodium and potassium were also similar to the findings of Sesh *et al*. (2013) [15] who opined that hyponatremia and hypokalemia might be due to drainage of sodium and calcium from the blood into cardiac tissue for depolarization and excitation of cardiac muscle respectively. To gain the maximum benefit from treatment, we need to individualize drug use and carefully monitor electrolytes (Agata Bielecka-Dabrowa *et al.* 2012) [1].

Electrocardiography

Some of the ECG abnormalities were increased R amplitude, deep S wave, increased P wave amplitude, electrical alternans and deep S wave, deep S and wide P wave, deep Q wave, wide P wave, low voltage QRS complexes, ventricular tachycardia, absence of P wave, ST coving, ventricular premature complexes, fine atrial fibrillation, wide QRS, electrical alternans and elevated T wave. Increased R wave amplitude (more than 3 mV) suggesting left ventricular enlargement was the predominant finding in dilated cardiomyopathy. Martin (2002) [10] reported that left ventricle enlargement is a feature of either mitral valve insufficiency or dilated cardiomyopathy in dogs.

Thoracic Radiographic findings

The common findings in dogs with cardiac disorder is cardiomegaly followed by pulmonary venous congestion, increased sternal contact, auricular bulge, left atrial enlargement, pleural and pericardial effusion. Jeyaraja *et al.* (2008) [8] documented cardiomegaly in 94 % cases.

Echocardiographic findings

Dilated cardiomyopathy followed by mitral valve insufficiency, pericardial effusion, tricuspid valve insufficiency, pleural effusion with pericardial effusion, pericardial effusion with dilated cardiomyopathy and hypertrophic cardiomyopathy were suggestive of cardiac disorders. Baumgartner and Glaus (2004) [2] reported that valvular diseases and dilated cardiomyopathy were the most common acquired diseases in dogs. It was revealed that in dogs that were diagnosed with DCM (Dilated cardiomyopathy) there was a significant increase in the dimensions of LVEDd and LVEDs. In addition there was a significant decrease in the values of LVPWd, LVPWs, IVSd and IVSs with a significant increase in the EPSS values of all dogs. Further, there was a significant ($P<0.01$) decrease in contractility indices such as, EF and FS in the DCM dogs. The diastolic excursion of the cranial mitral valve leaflet is flow related. Decreased systolic outflow results in decreased diastolic inflow and therefore a decreased mitral valve excursion. This fact coupled with the cranial displacement of the septum in the dilated heart results in excessive E-point septal separation in myocardial failure. Gamcarz (2007) [7] stated that echo cardiographic evaluation of diastolic parameters in dogs with dilated cardiomyopathy revealed a significant difference in the left ventricle dimensions when compared with that of the healthy dogs. However, Singh *et al*. (2012) [16] reported that in late dilated cardiomyopathy, both

systolic and diastolic left ventricular dimension and EPSS ratio were increased with reduced fractional shortening (FS). Mild mitral regurgitation was observed in some cases of late DCM. In early DCM there was normal diastolic dimension (LVIDd) but increased systolic left ventricular dimension (LVIDs) and hence reduced FS.

Summary

Among a battery of diagnostic protocols, Echocardiography was found to be very useful and highly sensitive in confirming various cardiac disorders and doppler echocardiography is no comparision for diagnosing valvular insufficiency in dogs. Qualitative improvement was reflected by clinical findings and radiographic findings while quantitative improvement was reflected by echocardiography particularly by left ventricle indices viz., EF and FS.

References

1. Agata Bielecka-Dabrowa, Dimitri Mikhailidis P, Linda Jones, Jacek Rysz, Wilbert Aronow S, Maciej Banach. The Meaning of Hypokalemia in heart failure. International Journal of Cardiology. 2012; 158(1):12-17.
2. Baumgartner C, Glaus TM. Acquired cardiac diseases in the dog: a retrospective analysis. Schweizer archive fur Tierheilkunde. 2004; 146(9):423-430.
3. Allworth SM, Church DB, Maddison JE, Einstein R, Brennar P, Anssein NA *et al*. Effect of enalapril in dogs with pacing induced heart failure. American Journal of Veterinary Research. 1995; 56:86-94.
4. Boghian V. Hematological and biochemical blood aspects for dogs with chronic congestive cardiac insufficiency (CCCI). Ion Ionescu de la Brad, Iasi. 2012; 55(1-2):237-239.
5. Dominique Pennique, Marc-Andre d Anjou. Atlas of small animal ultrasonography, I edn., Blackwell Publishing, Australia, 2008.
6. Dove RS. Nutritional therapy in the treatment of heart disease in dogs. Alternative Medicine Review. 2001; 6:38-45.
7. Gamcarz MA. Echocardiographic evaluation of diastolic parameters in dogs with dilated cardiomyopathy. Polish Journal of Veterinary Sciences. 2007; 10(4):207-215.
8. Jeyaraja K, Gowri B, Nambi AP, Vasu K. Echocardiographic evaluation of dilated cardiomyopathy in dogs. Indian Veterinary Journal. 2008a; 85:983-984.
9. Joanna Dukes McEwan, Michele Borgarelli, Anna Tidholm, Andrea Vollmar C, Jens Haggstrom. Proposed Guidelines for the Diagnosis of canine idiopathic dilated cardiomyopathy. The ESVC Taskforce for canine dilated cardiomyopathy. Journal of Veterinary Cardiology. 2003; 5(2):7-19.
10. Martin M. ECG interpretation in small animals 2. Abnormalities in the conduction system. In Practice. 2002; 24:194-203.
11. Paul Wotton. Challenges and Advances in Veterinary Cardiology. Journal of Small Animal Practice. 2010; 51(8):409-10.
12. Reece William O. Dukes Physiology of Domestic Animals. 12th Ed. Cornell University Press, Ithaca, 2004, 999.
13. Ristic J. Clinical assessment of the dog with suspected cardiac disease. In Practice. 2004; 26:192-199.
14. Schalm OW, Jain NC, Carol EJ. Veterinary Haematology, 4th edition, Lea and Febiger, Philadelphia. 1986, 15.
15. Sesh PSL, Venkatesan P, Jeyaraja K, Chandrasekar M, Pandiyan V. Blood Biochemical, Enzymatic and Haematological status of dogs affected with dilated cardiomyopathy. International Journal of Advanced Veterinary Science and Technology. 2013; 2(1):47-51.
16. Singh AP, Singh N, Mahajan SK. Echocardiography as a definitive diagnostic tool for dilated cardiomyopathy in dogs. Indian Journal of Veterinary Surgery. 2012; 33(2):94-98.
17. Singletary GE, Morris NA, Lynne O'Sullivan M *et al*. Prospective evaluation of NT-proBNP assay to detect occult dilated cardiomyopathy and predict survival in Doberman Pinschers. Journal of Veterinary Internal Medicine. 2012; 26:1330-1336.
18. Vykunta Rao V, Vasu K, Prathaban S. L-Carnitine responsive dilated cardiomyopathy in Doberman Pinschers. Indian Veterinary Journal. 2008; 85:1104-1106.
19. Wess G, Schulze A, Butz V. Prevalence of dilated cardiomyopathy in Doberman Pinschers in various age groups. Journal of Vetetinary Internal Medicine. 2010; 24:533-538.