CASE REPORT

Diagnosis and Therapeutic Management of Myxomatous Mitral Valvular Degeneration (MMVD) in Daschund Dog – A Case Report

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Introduction

Myxomatous mitral valve disease (MMVD) is considered to be the most common heart disease of dogs globally. Approximately 30% of dogs over 10 year's age possess the characteristic left-sided systolic murmur of degenerative DMVD and resulting mitral regurgitation (Buchanan, 1977). It is estimated that approximately 10% of dogs presented to primary care veterinary practices have heart diseases and congenital valvular heart diseases (CVHD) is the most common heart disease among them (Atkins *et al.,* 2009). The myxomatous degeneration of the mitral valve accounts for approximately 75% of heart disease and affects mostly small to medium sized breeds, although large breeds have also been reported. The disease may progress from asymptomatic to acute congestive heart failure eventually and often prove fatal (Borgarelli and Haggstrom, 2010). On clinical examination of myxomatous valvular degeneration (MVD), a heart murmur is a consistent finding and is characteristically systolic and noticed on left apical region of heart. Further, electrocardiography (ECG) and echocardiography are useful for confirmatory diagnosis. A classification system including 4 distinct stages (A–D) has been reported to assist with the diagnosis and treatment of valvular disease. Dogs affected by MVD that develop chronic heart failure (CHF) are in stage-C as per the guidelines given by American College of Veterinary Internal Medicine (ACVIM) (Keene *et al.,* 2019). Therapeutic management is usually comprised of furosemide to provide diuresis, ACE-inhibitors and spironolactone to counteract renin-angiotensin-aldosterone system (RAAS) activation. However, stage-C dogs do require a tailored pharmacological approach in which drugs and their dosages are adjusted based on the patient's clinical status.

Case History and Clinical Observations

A 14-years-old Dachshund male dog weighing 21 kg was presented at Veterinary Clinical Complex, Veterinary College, Kamdhenu University, Navsari, Gujarat with history of coughing, lethargy, dyspnoea, exercise intolerance and syncope. Deworming and vaccinations were up-to-date. Dog was initially treated by field veterinarian with steroid and antiepileptic therapy for sudden control of syncope. The clinical examination revealed normal rectal temperature, increased capillary refill time (>3 seconds), dyspnoea with increased respiration rate (>35/minute) and pulse deficit. Auscultation of the heart revealed arrhythmia with increased heart rate (190/min) and a high intensity holosystolic left sided apical heart murmurs. Respiratory sounds were increased with crackles during the end of inspiration. During the clinical examination, dog showed symptoms of syncope and become recumbent with hyper-salivation and tachycardia. Hence, immediately shifted to intensive care unit (ICU) of department where electrocardiography, blood pressure measurement and echocardiography were performed. The rectal temperature was mildly elevated (103.5°F).

Based on clinical examination, case was suspected for cardiac abnormality and further diagnosis was made based on electrocardiography and echocardiographic examination. The electrocardiography revealed atrial fibrillation (Fig. 1). The blood pressure was not affected much (systolic 125/ diastolic 75). Echocardiography confirmed

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Fig. 1: Electrocardiography showing a trail fibrillation (arrow mark) with increased heart rate

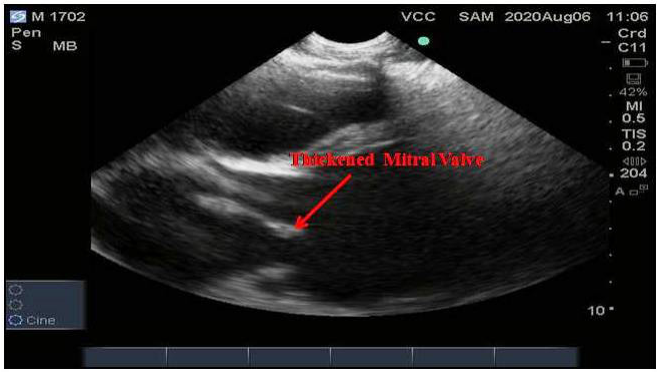

Fig. 2: Thickened mitral valve leaflets in MMVD affected dog

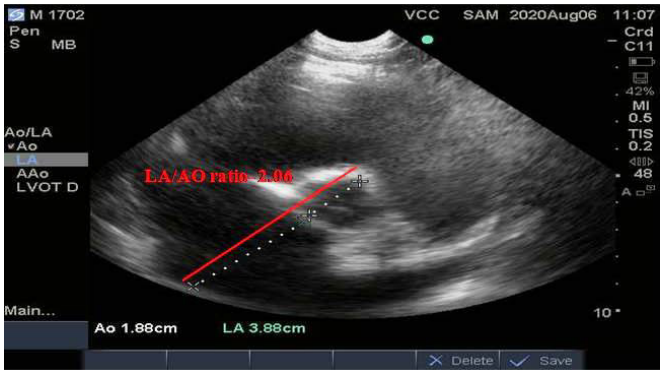

Fig. 3: Increased LA/Ao ratio in MMVD affected dog

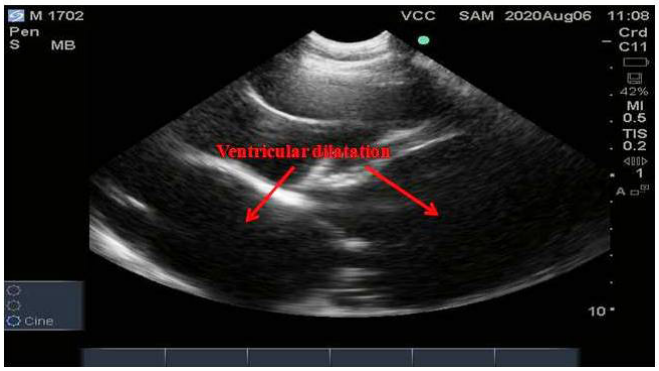

Fig. 4: Ventricular dilatation in MMVD affected dog

severe dilatation of left-sided chamber. The free side of the mitral valve leaflet was mildly thickened during diastole and systole (Fig. 2). The LA/Ao ratio was increased (Fig. 3) (LA/Ao = 2.06; normal <1.6). Ventricular dilatation was also observed in M-mode during systole and diastole (Fig. 4) (LVEDD = 5.19 cm, LVESD = 4.44 cm and EF = 30%). Chordae tendinae were normal. Diagnostic tests were performed to evaluate all the symptoms. Complete blood count showed mild neutrophilia (78%), whereas serum biochemistry revealed decreased total protein (3.57 gm/dl) with mild elevated creatinine (1.58 mg/dl) and urea (37.63 mg/dl) with normal ALT (43.13 U/L) and AST (21 U/L). Based on the clinical examination, blood picture, electrocardiography and echocardiographic examination, the present case with mitral insufficiency was diagnosed as Myxomatous mitral valve disease.

Treatment and Discussion

During the clinical examination, dog showed symptoms of syncope and become recumbent with hyper-salivation and tachycardia. Therefore, dog was immediately shifted to intensive care unit (ICU) of department. Initially stabilization of patient was made with intravenous injection of dexamethasone and furosemide. Further, dog was put on oral Tab Enapril® 5 mg (Enalapril maleate @ 0.5 mg/kg), Tab Lasilactone® 50 mg (Furosemide 20 mg + Sprionolactone 50 mg @ 2 mg/kg) and Tab. Safeheart 5 mg® (Pimobendan @ 0.5 mg/kg) one tablet each twice daily for 10 days and Tab. Ataxin® 150 mg (Enrofloxacin @ 3.5 mg/kg) half tablet twice daily for three days only. On 11th day, dog showed marked clinical improvement with improved exercise tolerance during moderate to marked effort. An electrocardiogram (Lead II, 25 mm/s, 10 mm/mV) showed marked improvement in the arrhythmia. Blood chemistry panel (BUN, creatinine, AST, ALT and Total protein) was within normal limits. The treatment was continued with reduced dose (1 mg/kg) of Tab Lasilactone® for a month and the dog showed uneventful recovery with gain in body weight.

Chronic mitral valve disease is the most common heart disease in the dog. It affects small breed dogs in which significant morphological changes of the mitral valve apparatus occur (Haggstrom *et al.,* 2004). The present case describes particulars of chronic mitral valve disease in a small breed dog (Dachshund) with several characteristic anomalies. A polygenic mode of inheritance is suggested in Dachshunds for developing myxomatous mitral valve disease (Olsen *et al.,* 2003). In accordance with the modified guidelines the New York Heart Association (NYHA) of heart

failure, the presented dog was showing symptoms of coughing, lethargy, syncope and exercise intolerance, which fall under the class III heart failure. The common presenting clinical signs of canine cardiac patients are coughing (75%), syncope (49%), and cyanosis (14%) (Kim *et al.,* 2017). Dogs with MMVD are normally presented with systolic murmur, which is best heard at the left cardiac apex and there is a strong correlation between the cardiac murmur and severity of MMVD (Disatian, 2010). Similarly, murmur was auscultated in present case along with atrial fibrillation on electrocardiographic examination. The atrial fibrillation is the most common arrhythmia noticed in the dog affected with dilatation due to mitral valve degeneration (Borgarelli *et al.,* 2004).

Echocardiography helps to evaluate the structure of the heart as well as provides more measurement details regarding the degree of right or left atria enlargement, end diastolic volume, ejection fraction and fractional shortening. The common echocardiographic findings of MMVD are thickening of one or both mitral valves according to ACVIM consensus (adapted from the American College of Cardiology/American Heart Association classification system). A higher left atrium to aortic ratio is also associated with a more severe atrioventricular valvular heart disease (Borgarelli and Buchanan, 2012). Based on ACVIM guidelines, the present case can be categorized into stage-C in which dogs shows signs of heart failure including lethargy, coughing. The medications recommended by ACVIM consensus for patient of stage-C are furosemide at 1-4 mg/kg dose which can be adjusted as needed depending on the condition, pimobendan 0.2-0.3 mg/kg twice daily and angiotensin-converting enzyme inhibitor (ACE-I) 0.5 mg/kg in MMVD dogs. Based on the above recommendation, the therapeutic regimen was followed, and good treatment response was noticed. Treatment should be individualized to minimize the clinical signs and improve quality of life (Borgarelli and Buchanan, 2012). Dogs with MMVD have a guarded to poor prognosis depending on stage of clinical presentation. Therefore, confirmatory diagnosis followed by tailored treatment for MMVD affected dogs extends life of loving pet dogs. Further, regular follow up visit with cardiologist to monitor the cardiac diseases progression is recommended.

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