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### A study on demonstration of collagen and acid mucopolysaccharides in diffuse myxomatous valvular degeneration in dogs

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**Abstract**

A nine years old, male non-descript dog was presented with the history of anorexia, lethargy, exercise intolerance, coughing and recumbency for two weeks. Auscultation revealed heart murmur. Necropsy showed tricuspid valve was very thick and opaque. Histopathologically there was deposition of myofibroblast. Alcian blue staining revealed diffuse infiltration of mucopolysaccharides and extensive decrease in amount of collagen in tricuspid valve in comparison to mitral valve in masson's trichrome staining. Based on physical and clinical observations, postmortem and pathological examinations were confirmed the disease condition as diffuse myxomatous tricuspid valvular degeneration.

**Keywords:** Dog, valvular degeneration, histopathology, alcian blue stain

**Introduction**

Degenerative valve disease (DVD) also called as myxomatous valvular degeneration, endocardiosis, valvular regurgitation, valvular insufficiency is a leading cause of heart failure in dogs [1]. 70-80% of heart related diseases is mainly due to DVD [2, 3]. Myxomatous valvular degeneration is most oftenly leads to lesions of the mitral valve (75%), infrequently the tricuspid valve (30%) and sometimes both atrioventricular valves [4, 5, 6]. Research has shown that the disease affects 90% of dogs over 13 years and 58% of dogs over 9 years of age [7]. This disease most commonly seen in small breed dogs, but can also affect in other breed [7]. Males develop disease at an earlier age than females.

**Case history and Observation**

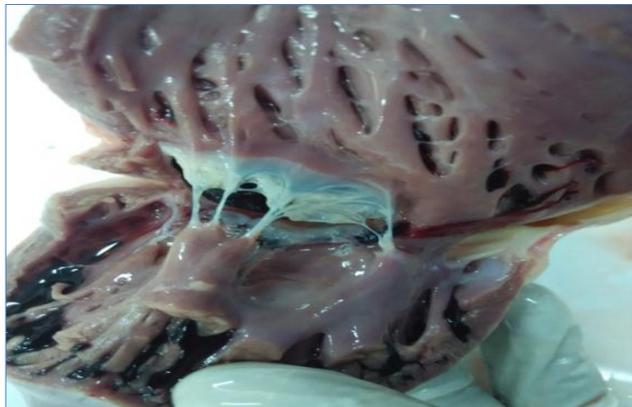
A nine year old male non-descript dog was presented to Madras Veterinary College Teaching Hospital, Chennai with the history of anorexia, lethargy, exercise intolerance, coughing and recumbency for two weeks. Animal was cachectic and showed dyspnoea and extensive subcutaneous ventral oedema. Auscultation revealed heart murmur and pleural effusion. Animal collapsed during examination.

**Result and Discussion**

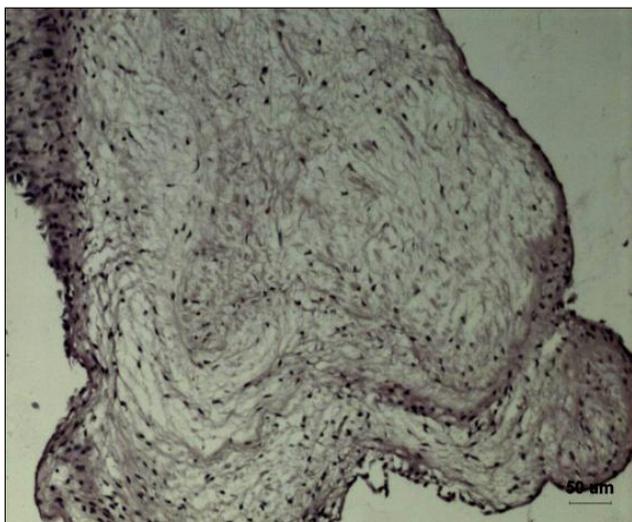
Degenerative valve disease is often diagnosed during clinical examination on the basis of typical heart murmur heard during auscultation. A direct relationship has been shown between the intensity of heart murmur and the severity of heart disease and it has been shown that dogs with heart murmur are at the higher risk of cardiac disease [4, 7, 8]. Necropsy revealed extensive subcutaneous edema of the whole body. Thoracic and abdominal cavity contained about 1L and 1.5L of serous fluid respectively. Right atrium and ventricle were dilated and the heart was rounded in appearance. Tricuspid valve was very thick and opaque (Fig.1) and mitral valve was very transparent. Affected valves were appeared smooth and shiny, shortened, thickened diffusely leads to incomplete coaptation of the valve and regurgitation. This results in atrial and ventricular enlargement [6, 9].

Histopathologically, valvular degeneration is characterized by invasion of the pars spongiosa into pars fibrosa and cause focal disruption and fragmentation of the bundles [10]. Tricuspid valve showed severe diffuse myxomatous degeneration (Fig.2) while the mitral valve showed mild degeneration [11]. Alcian blue staining revealed diffuse infiltration of mucopolysaccharides invading the collagen structure in tricuspid valve (Fig.3) and changes were mild in mitral valve.

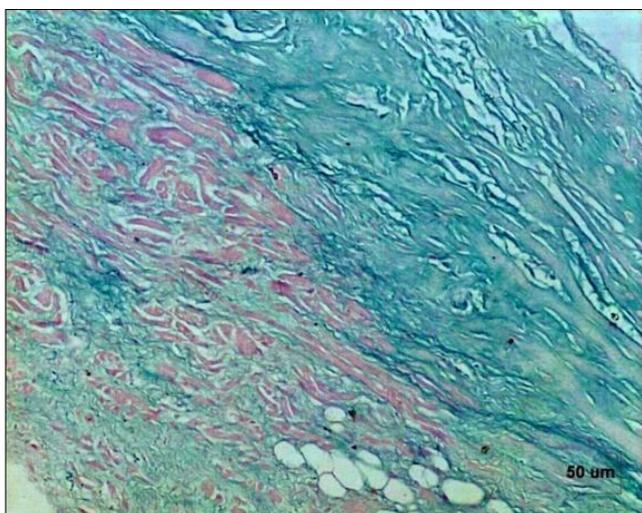
These alterations are known as mucopolysaccharidoses characterized by a functional deficiency caused by genetic mutation of lysosomal enzyme that acts on the sequential catabolism of glycosaminoglycans [11, 12]. Microscopically thickened valves have increased myofibroblast proliferation (Fig.4). Masson's trichrome staining showed extensive decrease in amount of collagen in tricuspid valve when compared to mitral valve (Fig.5).



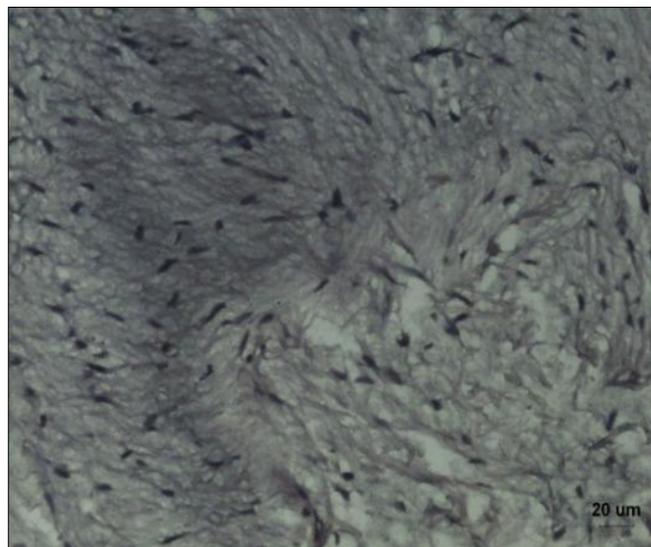
**Fig 1:** Thickened and opaque tricuspid valve



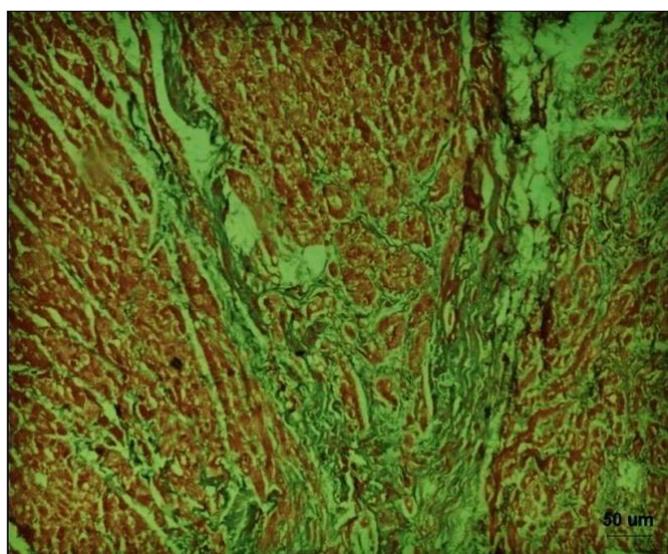
**Fig 2:** Degeneration of Tricuspid valve. H&E, 40x



**Fig 3:** Alcian blue staining - Deposition of acid mucopolysaccharides. 40x



**Fig 4:** Proliferation of myofibroblast in tricuspid valve. H&E, 200x



**Fig 5:** Masson Trichrome staining – Distorted and fragmented collagen fiber

**Conclusion**

MVD is the most common cause of congestive heart failure and cardiac related mortality in dogs. It has great pathophysiological similarity to humans.

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