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Structural and Cellular Changes in Canine Myxomatous Mitral Valve Disease: An Image Analysis Study.

Richard I Han¹, Alex Black², Brendan M Corcoran¹

¹University of Edinburgh, Roslin, Scotland, United Kingdom, ²National University of Ireland, Galway, Ireland

Objectives:

Myxomatous mitral valve degeneration (MMVD) is the single most common cardiac disease of the dog, and is analogous to Mitral Valve Prolapse in humans. The aim of this study was to identify morphological and cellular changes associated with MMVD.

Method:

Valves were collected at post mortem from normal dogs and affected dogs with varying degrees of disease progression (graded 1 to 4), and processed for light microscopy. Image analysis techniques were used to measure valve leaflet lengths, thickness, connective tissue content and density, cell density and cell shape in normal spongiosa and myxomatous areas of diseased valves.

Results:

Significant changes occurred in thickness for both anterior and posterior leaflets as disease progressed. There was significant reduction in cell numbers in overtly myxomatous areas of affected valves compared to the normal, but no difference between the grades of disease. The majority of the cells in both diseased and normal valves had a circularity score typical of an elongated shape. Connective tissue derangement was seen in the myxomatous areas and associated with a significant reduction in connective tissue density compared to normal. The reduction in connective tissue density was associated with disease severity.

Conclusions:

Canine mitral valve myxomatous degeneration is associated with thickening of valve leaflets, loss of connective tissue and a reduction in cell numbers in overtly diseased areas. To our knowledge this is the first study to use computed image analysis to assess morphological changes in diseased mitral valves.