

**Myocardial function assessed by two-dimensional  
speckle-tracking echocardiography in dogs**

**Abstract of Doctor Thesis**

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Two-dimensional speckle-tracking echocardiography (2D-STE) has recently been used to assess myocardial deformations in humans and dogs. This technique provides better quantification of regional and global myocardial deformations and might have higher sensitivity than conventional echocardiographic parameters for detecting subtle myocardial function abnormalities. However, the effect of age and heart rate (HR) on 2D-STE variables has not previously been reported.

Myxomatous mitral valve disease (MMVD) is the most common cardiac disease of dogs, and some dogs with MMVD develop myocardial dysfunction due to enlargement and remodeling of the heart. Recently, systolic dysfunction is associated with poor outcomes in dogs with MMVD. However, assessment of systolic function using conventional echocardiographic methods is difficult in mitral regurgitation (MR) owing to altered hemodynamic loading conditions and sympathetic tone. We hypothesized that myocardial deformations assessed by 2D-STE could be useful markers of systolic dysfunction in dogs with MMVD. This study was designed to assess 1) the effect of HR and age on 2D-STE variables in healthy dogs, 2) multidirectional myocardial deformations derived by 2D-STE in dogs with various stages of MMVD, and 3) myocardial deformations during a dobutamine stress test with 2D-STE in dogs with experimentally induced chronic MR.

We confirmed that the effect of HR and age on myocardial function assessed by 2D-STE in dogs. The present study obtained normal values for 2D-STE variables in various HR and young and old dogs, and these can be used as preliminary data for the establishment of reference

intervals of 2D-STE in the dog. This study also indicated that multidirectional myocardial deformations could be assessed using 2D-STE to evaluate myocardial function of non-sedated dogs with adequate repeatability. These multidirectional myocardial deformations might improve the clinical assessment of cardiac function in dogs with MMVD. As the torsion is directly related to helically-oriented myocardial fibers, the lower torsion in dogs with severe MMVD may contribute to latent systolic dysfunction. Finally, this study suggests that contractile reserve assessed by dobutamine stress test with 2D-STE is useful tool for early detection of the systolic dysfunction in dogs with MR.