# Evaluation on left ventricular systolic function using transthoracic continuous-wave Doppler echocardiography in dogs with experimentally induced mitral regurgitation

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The peak rate of left ventricular (LV) pressure rise (peak dP/dt) is one of the commonly used indexes of LV systolic function and is measured invasively by cardiac catheterization. The peak dP/dt and the severity of mitral regurgitation (MR) have been demonstrated to be estimated noninvasively using transthoracic continuous-wave Doppler echocardiography in human patients with MR. The aim of the present study is to validate the accuracy of the method in dogs with experimentally induced MR

Transthoracic continuous-wave Doppler echocardiography was performed to obtain MR velocity curves in the dogs under general anesthesia and controlled ventilation while their cardiac contractile state was changed by dobutamine and propranolol. Doppler-derived dP/dt (D-dP/dt) and time to peak velocity index (TPVI) were calculated from the analysis of the MR velocity curves using the following equations.

D-dP/dt = 32mmHg/t (mmHg/sec)

(t : time taken for the MR velocity to rise from 1 to 3 m/sec)

TPVI = a/b×100 (%)

(a : time taken from onset of the MR velocity to peak velocity,

b : duration of the MR velocity curve)

The D-dP/dt and TPVI were compared to peak dP/dt and pulmonary capillary wedge pressure (PCWP) simultaneously measured by cardiac catheterization.

There was a good correlation between D-dP/dt and peak dP/dt ($n=90$, $r=0.900$, slope$=0.892$, $p<0.0001$). The correlation coefficient however tended to decrease slightly in the cases of increased PCWP (0–10mmHg : $r=0.985$, 10–20mmHg : $r=0.908$, 20mmHg≦ : $r=0.754$) and decreased (<100bpm) or increased (150bpm≦) HR. There was no correlation between the TPVI and the PCWP.

The present study suggests that peak dP/dt can be approximately estimated by analyzing continuous-wave Doppler velocity curves of MR and may suggest the possibility of estimating LV systolic function noninvasively in dogs with MR.