[gw22-e0560]

THE VALUE OF MYOCARDIAL CONTRAST ECHOCARDIOGRAPHY IN EVALUATING THE RELATIONSHIP BETWEEN MYOCARDIAL PERFUSION AND CARDIAC RESYNCHRONISATION THERAPY: AN ANIMAL STUDY

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10.1136/heartjnl-2011-300867.707

Objective To establish an animal model of heart failure and cardiac resynchronisation therapy (CRT) after myocardial infarction. Myocardial contrast echocardiography (MCE) was used to quantitatively analyse the myocardial perfusion in order to evaluate the relationship between myocardial perfusion, cardiac synchrony and the response of CRT.

Methods Twenty adult Beagles were randomly divided into group A (CRT group, n=10) and group B (non-CRT group, n=10). All of them had heart failure after a ligature in the first diagonal branch. A left ventricular epicardial lead, a right atrium and a right ventricle leads together with the pacemaker were implanted. The pacing was started in group A after myocardial infarction, but was not started in group B. MCE was performed before and 2 weeks after myocardial infarction, 2 weeks and 4 weeks after CRT. Speckle tracking imaging was used to evaluate standard deviation of time to peak of transmural regional circumferential strain (Cir 12SD) and radial strain (R 12SD).

Results Two dogs in group A and one dog in group B died of ventricular fibrillation after myocardial infarction, other dogs successfully completed the study. The myocardial blood flow (MBF) in normal Beagles was 74 ± 4 dB/s. The MBF of myocardial infarction region was 9 ± 2 dB/s. The MBF of group A was significantly higher than that of group B (2 weeks after CRT (35 ± 3 dB/s) vs (16 ± 3 dB/s), 4 weeks after CRT (54 ± 5 dB/s) vs (24 ± 4 dB/s), all $P < 0.05$). 30 dB/s was defined as a cut-off value before CRT, the sensitivity and specificity of predicting the response of CRT are 66.7% and 80% respectively.

Conclusion CRT can improve cardiac synchrony and myocardial perfusion in the animal model. The MBF value can represent the level of myocardial perfusion. The MBF value and the response of CRT are positively correlated. The sensitivity and specificity are 66.7% and 80% when MBF > 30 dB/s was defined as a cut-off value for predicting the response of CRT.