A Novel Dyssynchrony Index of Chest Vibrations for the Evaluation of Cardiac Synchrony

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Width of QRS and echocardiographic methods for the evaluation of cardiac synchronicity and prediction of response to biventricular pacing are limited. Right ventricular pacing alters sequence of ventricular contraction and may result in reduced ventricular systolic function. We developed a new transthoracic method for recording and mapping of cardiac mechanical vibrations. Aim: Evaluation of cardiac synchrony in subjects with right ventricular pacing using a new tarnsthoracic vibration systolic dyssynchrony index (VSDI) and comparison to normal subjects. Methods: Thirty four subjects were examined, 24 were normal controls and 10 subjects with right ventricular apical pacing. A matrix of 5x5 transducers was applied to the chest and the vibrations were mapped and recorded digitally. The interval between the onset of q-wave and the peak of the amplitude of vibration for each transducer was measured and a colored three dimensional map for the whole matrix of transducers was generated (figures). VSDI for each subject was determined as the standard deviation of the difference between the median value and each transducer interval. Results: VSDI for normal controls (12.6±6.2msec) was lower than for patients with right ventricular pacing (30.3±9.9msec), $p<0.05$. VSDI correlated with QRS width, however with various degrees of dyssynchrony. Conclusions: A simple new transthrocic dyssynchrony index can differentiate between various degrees of cardiac dyssynchrony related to QRS width in patients with right ventricular pacing.