Comparison of acoustic quantification and Doppler echocardiography in assessment of left ventricular diastolic variables

Heart 1993;70:448-456

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Abstract

Objective

To assess the haemodynamic correlations of the waveforms of left ventricular area change obtained by automated boundary detection with newly developed acoustic quantification technology.

Design

The timing of events in the cardiac cycle was identified on the wave-form automated boundary detection and was correlated with the corresponding timing derived from pulsed wave Doppler flow velocity traces of the mitral valve and left ventricular outflow tract. The amounts of area change during the rapid filling phase and during atrial contraction were correlated with the time-velocity integrals of early and late diastolic ventricular filling obtained from Doppler tracings of the mitral inflow.

Setting

A university medical school echocardiography laboratory.

Subjects

16 healthy volunteers and 19 patients referred for echocardiographic studies.

Results

A significant correlation was found between the methods for measurement of the time from the R wave to mitral valve opening ($r = 0.72$, $p < 0.01$), isovolumic relaxation time ($r = 0.62$, $p < 0.01$), and ejection time ($r = 0.54$, $p < 0.01$). The change of total area that occurred during rapid filling and atrial filling phases measured from the acoustic waveform correlated with the time-velocity integrals of the early and late diastolic mitral valve inflow velocity derived from Doppler echocardiography ($r = 0.60$ and $r = 0.80$, respectively).

Conclusion

The waveform of left ventricular area obtained by the automated boundary detection technique identifies the phases of the cardiac cycle and correlates with Doppler values of left ventricular diastolic function. Therefore, this new method of automated boundary detection has potential uses in the assessment of left ventricular diastolic function.