Simplified Three-Dimensional Measurement of Left Ventricular Volume and Ejection Fraction Using Automated Contour Tracking Method in Patients

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Background: Automated contour tracking (ACT) method allows automated detection of the left ventricular (LV) endocardial boundary of echocardiographic apical two-dimensional (2D) images. Application of ACT method to apical 4- and 2-chamber views provides simplified automated three-dimensional (3D) measurement of LV volumes and ejection fraction (EF). The purpose of this study was to evaluate the accuracy of this automated 3D measurement of LV volumes and EF with the ACT method in patients who underwent quantitative gated SPECT (QGS).

Methods: The study population was consisted of 37 consecutive patients who underwent QGS because of suspected ischemic heart disease (IHD). In every patient, apical 4- and 2-chamber views and long-axis view were obtained by 2D echocardiography. In each case, three sample points were placed on both sides of the mitral annulus and the LV apex, in the end-diastolic (ED) image of apical views. In the apical long-axis view, additional one sample point was placed on the LV apex in the ED image. The endocardial border was identified automatically, and extraction of the endocardial border of the LV cavity was completed in every frame throughout one cardiac cycle. ED and end-systolic (ES) 3D-LV volumes were calculated from these automated endocardial tracking. The automated 3D measurements of LV volumes and EF measurements were compared with those by QGS.

Results: In 30 patients of 37 patients (81%), adequate images were obtained for 3D-LV volumes and EF analyses. LV ED and ES volumes by the 3D-ACT method were correlated well with those by QGS (r=0.82±0.10, r>0.97 and r=0.84±0.03, r>0.98, respectively). The mean differences in LV ED and ES volumes between ACT and QGS were 6.1±4.4ml and 4.4±4.9ml, respectively (mean±SD). LVEF obtained by the ACT method was agreed well with that obtained by QGS (r=0.89±0.16, r<0.02). The mean difference was −0.1±0.6%.

Conclusion: The simplified automated 3D method with ACT provides accurate measurement of LV volumes and EF in patients with suspected IHD.

Postextrasystolic Shortening Is Consistently Prevalent in Nonviable Myocardial Infarction: Comparison With Contrast-Enhanced Magnetic Resonance Imaging

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Background: The assessment of myocardial viability in patients after acute myocardial infarction (MI) is a major diagnostic challenge. Revascularization is likely to be more successful in those with viable (although functionally impaired) myocardium. However this is not easy to do non-invasively and currently magnetic resonance imaging (MRI) is the gold standard. However, this technique currently cannot provide real-time information.

Methods: Standard echocardiography with Tissue Doppler echocardiography was performed in 43 first MI (24 anterior/19 inferior) patients (age 59.5±11.5yrs) within 6 days of symptom onset. The patients were divided into 2 groups: 8 patients with carotid artery disease, 4 patients with carotid artery disease and 37 patients with no carotid artery disease. Echocardiography, Tissue Doppler echocardiography and magnetic resonance imaging were performed in all subjects. When cyclic variation showed asynchrony, we expressed its magnitude as cycle-by-cycle variation in the wall motion score index.

Results: In 30 patients of 37 patients (81%), adequate images were obtained for 3D-LV volumes and EF analyses. LV ED and ES volumes by the 3D-ACT method were correlated well with those by QGS (r=0.82±0.10, r>0.97 and r=0.84±0.03, r>0.98, respectively). The mean differences in LV ED and ES volumes between ACT and QGS were 6.1±4.4ml and 4.4±4.9ml, respectively (mean±SD). LVEF obtained by the ACT method was agreed well with that obtained by QGS (r=0.89±0.16, r<0.02). The mean difference was −0.1±0.6%.

Conclusion: The simplified automated 3D method with ACT provides accurate measurement of LV volumes and EF in patients with suspected IHD.

Ultrasound Myocardial Tissue Characterization Allows Early Detection of Cardiac Involvement in Patients With Sarcoidosis

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Backgrounds: Although cardiac involvement is an important prognostic factor in patients with sarcoidosis, early detection of cardiac sarcoidosis is difficult. Cyclic variation of myocardial integrated backscatter (CV-IB), which provides noninvasive measurement of acoustic properties of the myocardium, may detect early myocardial involvement even in patients without apparent abnormality by 2-dimensional echocardiography (2DE).

Methods: The study patients consisted of 22 consecutive biopsy-proven patients with systemic sarcoidosis who did not have any abnormal findings on conventional 2DE. Cyclic variation of myocardial tissue characterization was performed in all patients. The cycle-by-cycle variation was calculated using the ratio of CV-IB in the systolic phase to the CV-IB in the diastolic phase. The cutoff values of CV-IB were determined using receiver operating characteristic curves.

Results: The patients were divided into 2 groups: 8 patients with cardiac involvement and 14 patients without cardiac involvement. In the basal left ventricle, reduction in the magnitude (1.8 ± 4.4 vs. 6.6 ± 1.3, P = 0.012) and

PARAOXYSMAL ATRIAL FIBRILLATION IN PATIENTS WITH HYPERTROPHIC CARDIOMYOPATHY

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Background: Paroxysmal atrial fibrillation (PAF) is a common complication of patients with hypertrophic cardiomyopathy, often leading to heart failure and cerebral infarction. Therefore, the early detection of patients with hypertrophic cardiomyopathy at risk for developing PAF may be useful in treatment strategies. Enlarged left atrium (LA) determined by multi-modality imaging might suggest the presence of highgrade coronary artery stenosis among patients with normal LV conduction complaining chest pain prior to coronary arteriography.

Methods: We studied 141 patients with hypertrophic cardiomyopathy and the right coronary stenosis were 86%, 93% and 65%, respectively. None of the subjects who did not have critical stenosis demonstrated positive PVR. Positive predicted value was 89% and negative predicted value was 44%. Sensitivities for the left anterior descending coronary artery (LAD) stenosis, the circumflex coronary artery (LCX) stenosis, and the right coronary artery stenosis were 86%, 56% and 65%, respectively.

Conclusion: Positive PVR appeared to be a marker of the critical stenosis in LAD and LCX with high sensitivity. This simple methodology may be used as an adjunct to predict the presence of high-grade coronary artery stenosis among patients with normal LV conduction complaining chest pain prior to coronary arteriography.