Poster session 1

Thursday, 8 December 2005, 8:30–12:30

Location: Poster Area

ISCHAEMIC HEART DISEASE

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Dissociation between regional rotation and regional strain in the ischemic left ventricle
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Background: Global LV rotation measured by MRI has proven to be a sensitive marker of global ventricular function. Recently, 2-D speckle tracking echocardiography has been proposed as a bedside method for quantification of regional LV rotation. The aim of this study was to investigate the distribution of regional rotation in the ischemic ventricle and to define the relationship between rotation and regional strains.

Methods: In 11 healthy individuals and 13 patients with previous anterior myocardial infarctions, LV apical short-axis recordings were obtained by conventional echocardiography. Combined circumferential strain (strainC) and rotation were measured in the anterior (ischemic), septal (adjacent), lateral (adjacent) and posterior (remote) segments by 2-D speckle tracking echocardiography. Rotation was assessed from apical view.

Results: In healthy individuals, regional strainC and rotation were homogenous in all segments (32.3±3.1% and 9.7±2.4°, respectively). In patients, however, strainC was significantly reduced in ischemic and both adjacent segments (p<0.0001), while rotation was reduced only in the lateral segment (p<0.001). StrainC in the septal and lateral segment were equally reduced in patients, 12.9±8.6 and 11.8±5.4% (NS). In contrast, rotation in the septal segment (direction of global apical rotation) was almost twice rotation in the lateral segment (p<0.05).

Conclusions: In the infarcted ventricle there was substantial rotational dispersion between adjacent segments of equal strain, probably due to tethering effects from non-ischemic segments. These observations indicate that regional rotation may have limited ability to localize segmental dysfunction.

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Diagnostic value of ultrasound-based strain imaging to coronary angiography in patient with suspected coronary artery disease
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Background: Strain imaging has already been shown to quantify regional myocardial function in acute ischemic myocardium and infarcted myocardium. We proposed that strain image could measure deformation of normal and dysfunctional myocardium without regional wall motion abnormality assessed by conventional echocardiography. The aim of this study is to address diagnostic value of strain imaging for detection and localization of coronary lesions in patients suspected coronary artery disease.

Methods: Strain imaging for advanced wall-motion analysis (Vivid 7 Dimension, GE Medical) was performed in 114 consecutive patients with chest pain but without visually apparent wall-motion abnormality by conventional echocardiography prior to coronary angiography. Longitudinal strain was measured in 3 apical views and assessment of strain value for 1824 individual segments using a 16-segment division of left ventricle were performed to determine the average strain value. Marked nonuniformity of strain was considered as abnormal, and significant coronary artery disease was considered if stenosis was above 50% from quantitative angiography.

Results: 46 patients showed a constant systolic strain throughout the wall and no coronary lesion was found in 34 patients. 54 of 68 patients with marked nonuniformity of strain had angiographically significant coronary stenosis (Table 1). 13 of 14 patients with abnormal strain pattern with normal coronary showed abnormal apical strain, and 7 of 12 patients with normal strain pattern with significant coronary artery disease had multi-vessel stenosis. Strain value under 5.7% was considered as the best discriminating value for the presence of critical stenosis.

Table 1

<table>
<thead>
<tr>
<th>Strain-positive value</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>Positive-predictive</th>
<th>Negative-predictive</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>79%</td>
<td>74%</td>
<td>82%</td>
<td>71%</td>
<td>81%</td>
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Conclusions: Ultrasound-based strain imaging demonstrates a strong correlation with coronary angiography and would have the potential as non-invasive diagnostic tool for detection of coronary artery stenosis in patients with chest pain but without apparent wall motion abnormalities on conventional echocardiography.

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Normal global left ventricular systolic function does not preclude significant contractile dysynchrony in stable ischaemic heart disease
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The up-to-date literature reports that validate the significant regional left ventricular (LV) contractile dysynchrony in patients with severe impairment of LV systolic function and presence of intraventricular conduction disturbances. The extent and significance of LV dysynchrony as measured with use of Pulsed Wave Tissue Doppler Echocardiography (PW-DTE) in the ischaemic heart disease patients with well preserved left ventricular systolic function or without history of severe myocardial in traction does not have been thoroughly investigated as yet.


Methods: 50 patients with single coronary vessel disease (critical stenosis of Left Anterior Descending Artery, normal LV Ejection Fraction (EF) and lack of intraventricular conduction disturbances (without RBBB or LBBB) underwent the study. The echocardiographic measurements of regional contractile function (l-cov-isoolumic contraction time) with use of PW-DTE was performed within the designated ischaemic (basal and medial segment of anterior wall and interventricular septum) and non-ischaemic (basal and medial segment of inferior wall) LV segments.

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