Abstract: P2470

The prognostic importance and inter-relationship of systolic and diastolic tissue Doppler velocities in heart failure patients with reduced ejection fraction

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On behalf: Cardiovascular Non-Invasive Imaging Research Laboratory (CIRL)

Topic(s):
Echocardiography: Systolic and Diastolic Function

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Background: Tissue Doppler imaging (TDI) can be used to evaluate both the systolic and diastolic function in patients with heart failure with reduced ejection fraction (HFrEF). However, previous studies have shown important inter-relationship between these measures in other patient populations.

Purpose: To investigate the prognostic importance and inter-relationship of systolic and diastolic TDI measures in HFrEF.

Methods: Conventional echocardiographic measurements together with peak longitudinal systolic (s'), early diastolic (e'), and late diastolic (a') myocardial velocities from all 6 myocardial walls were obtained from 1065 HFrEF patients. Outcome was all-cause mortality.

Results: Mean age was 67 years, 74% were male and mean left ventricular ejection fraction was 27%. During a median follow-up period of 40 months, 177 (16.6%) patients died. In univariable analyses, both s' and a' were associated with mortality (p<0.001), but e' was not (p>0.05). Patients were therefore stratified into high/low groups by the mean value of s' and a' respectively. The prognostic value of s' was significantly modified by a' (p for interaction 0.035). In patients with low s', low a' was associated with an increased risk of dying; HR 1.31 (CI: 1.17–1.55, P=0.001) per 1 cm/s decrease.

Patients with both impaired systolic and diastolic function as assessed by low s' and a' had over 3 times greater risk of dying compared to having both high measures of s' and a' (HR 3.39, CI: 2.1–5.1, p<0.001) (figure).

Having combined impaired systolic and diastolic function as assessed by low s' and a' remained an independent predictor of mortality even after multivariable adjustment for age, gender, body mass index, mean arterial pressure, ischemic cardiomyopathy, pacemaker, heart rate, total cholesterol, diabetes and conventional echocardiographic measures (HR 1.78 (CI: 1.04–3.04, p=0.035) (table)).

Conclusion: A pattern of combined low systolic and diastolic performance as assessed by s' and a' is a significant marker of adverse prognosis for patients with HFrEF, independent of conventional echocardiographic parameters.

Uni- and multivariable Cox regressions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Univariable model (95% CI)</th>
<th>Multivariable model*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HR (95% CI)</td>
<td>P value</td>
</tr>
<tr>
<td>High s' and high a' (n=386)</td>
<td>Ref</td>
<td></td>
</tr>
<tr>
<td>High s' and low a' (n=113)</td>
<td>1.48 (1.07–4.03)</td>
<td>0.24</td>
</tr>
<tr>
<td>Low s' and high a' (n=156)</td>
<td>2.26 (1.34–3.81)</td>
<td>0.002</td>
</tr>
<tr>
<td>Low s' and low a' (n=262)</td>
<td>3.29 (2.43–5.75)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Multivariable model adjusted for age, gender, body mass index, mean arterial pressure, ischemic cardiomyopathy, pacemaker, heart rate, total cholesterol, diabetes, left ventricular ejection fraction, left ventricular mass index, and
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Kaplan-Meier curves depicting survival

Figure: Kaplan-Meier curves showing the survival (%) by groups of s’ and a’ stratified by high and low mean values (cut-offs: 3.87 cm/s and 5.37 cm/s).

Kaplan-Meier curves depicting survival