Avaliação da Função Sistólica e Diastólica - os melhores índices da eco

Fausto J Pinto

Faculdade de Medicina
Universidade de Lisboa

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Algorithm for Diagnosis of Chronic HF or LV Dysfunction

- Suspected LV dysfunction because of signs
  - Assess presence of cardiac disease by ECG, X-ray or natriuretic peptides (where available)
  - Tests abnormal
    - Imaging by echocardiography (nuclear angiography or MRI where available)
    - Tests abnormal
      - Assess aetiology, severity, precipitating factors and type of cardiac dysfunction
      - Choose therapy
  - Tests normal
    - HF or LV dysfunction unlikely
- Suspected HF because of symptoms and signs
  - Tests normal
  - HF or LV dysfunction unlikely
  - Additional diagnostic tests where appropriate (e.g. coronary angiography)
Echo and Systolic Function

- Global Function
- Regional Function
- Ventricular remodeling
- Contractile reserve / ischemia / viability
- Valve function (MR important)
What Can be measured by Echo?

- LVIDd, LVIDs, fractioned shortening
- LVEDV, LVESV, EF (which method?)
- LV mass (method?)
- Cardiac output (LVOT Doppler)
- LV dP/dt (MR jet)
Longitudinal Function
Sm and cumulative cardiac death

Wang M et al J Am Coll Cardiol 2003;41:820
2D Strain/Speckle Tracking Imaging
Normal AFI

[Image of a circular diagram showing peak systolic strain with values such as -18.8%, -23.0%, -25.0%, and an average of -22.3%.]
Global longitudinal strain as a strong predictor of cardiac events in patients with depressed LV function: a multicenter study (n=144pts)

- GLS reproducibility was higher than LV EF (-8% vs -13%).
- ROC curve identified a value of GLS at -9% to predict cardiac outcomes with a sensitivity and specificity of 81% and 71% (AUC=0.80).
- A value of -9% allowed to determine patients with higher risk of cardiac events (p<0.01)

Mignot A et al EE 2008
Euroheart Survey on HF
Distribution of Ejection Fraction

11,015 patients in 115 hospitals in 24 countries

Percentage of patients

Escalad et al. Euroheart Survey EHJ 2003

*Women*

*Men*

Left Ventricular Ejection Fraction (%)

0 1 2 3 4 5 6 7 8 9 10 11 12 13

ESC Guidelines for the Diagnosis and Treatment of CHF - 2005
Prognostic value of mitral inflow restrictive pattern

Em and cumulative cardiac death

Wang M et al. J Am Coll Cardiol 2003;41:820
Estimation of LV filling pressures

Ommen SR et al Circulation 2000;102:1788
Assessing Filling Pressures: Prognostic Value

Hillis GS JACC 2004
Relationships between severity of diastolic dysfunction (DD) (left) and left atrial (LA) volume index (right) and survival

## Table 3. LAVi According to Diastolic Function Grade

<table>
<thead>
<tr>
<th>Diastolic Grade</th>
<th>n</th>
<th>% of Cohort</th>
<th>LAVi, ml/m² (Mean ± SD)</th>
<th>% Meeting Criteria for LAE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>1,212</td>
<td>73</td>
<td>23 ± 6</td>
<td>9</td>
</tr>
<tr>
<td>Grade I</td>
<td>315</td>
<td>19</td>
<td>25 ± 8</td>
<td>17</td>
</tr>
<tr>
<td>Grade II</td>
<td>118</td>
<td>7</td>
<td>31 ± 8</td>
<td>48</td>
</tr>
<tr>
<td>Grade III to IV</td>
<td>12</td>
<td>1</td>
<td>48 ± 12</td>
<td>100</td>
</tr>
</tbody>
</table>

*≥30 ml/m² in women or ≥33 ml/m² in men.

LAE = left atrial enlargement; LAVi = left atrial volume index.
Diagnostic flowchart on How to diagnose HFNEF in a patient suspected of HFNEF

3D Speckle tracking

3D myocardial strain estimation: first results in vivo

Radial (red), longitudinal (green) and circumferential (blue) strain curves estimated at different positions in the heart from 2 subsequently recorded 3D US data sets (top/bottom) of the same healthy volunteer and of a patient with an apical aneurism (right)

Elen A et al EE 2008
Real Time 3D
Volumetric analysis of regional left ventricular (LV) function

Valvuloarterial impedance (Zva) - global LV load

\[ Z_{va} = \frac{\text{Systolic BP} + \text{Mean transvalvular G}}{\text{LV stroke volume index}} \]

- Adverse events and symptom occurrence should better correlate with the global burden faced by the LV

- HTN pts with AS who develop symptoms have on average larger EOA than normotensive pts referred with the same symptoms

- Increased \( Z_{va} \) – independent prognostic value for LV dysfunction

Hachicha Z, Dumesnil JG, Pibarot P. in J. Am. Coll. Cardiol. 2009;54;1003-1011
Valvuloarterial impedance

- Zva predicts adverse outcome in asymptomatic patients with at least moderate AS

- Zva >4.5 mm Hg*ml⁻¹*m² was associated with a significant increase in the risk of overall and cardiovascular mortality

Hachicha Z, Dumesnil JG, Pibarot P. in J. Am. Coll. Cardiol. 2009;54;1003-1011
Future (Continuous) challenges for Echocg/Imaging

- The continuous role of echo/imaging as an added value to patient care
- The continuous identification of important clinical/scientific questions (“Curiosity driven”)
- Continuous technological development (“Technoscience”)
- Control of quality (individual and institutional)