二维超声心动图结合自动功能成像技术对房颤患者左室收缩功能的初步评价

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基金项目：惠州市科技计划项目（编号：20170405）

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【摘要】 目的 探讨二维超声心动图结合自动功能成像(AFI)技术对房颤患者左室收缩功能的评价效果。方法 选择2016-01～2019-12 该院收治的房颤患者41例，并将其分为左室射血分数(LVEF)正常组(LVEF≥50%，20例)和LVEF降低组(LVEF<50%，21例)。另选20名健康体检者作为对照组。比较三组左室舒张末期内径(LVEDd)、左室收缩末期内径(LVESd)以及左心室三腔观横向峰值应变(GLPS-LAX)、左心室四腔观纵向峰值应变(GLPS-A4C)、左心室二腔观纵向峰值应变(GLPS-A2C)和左心室平均纵向峰值应变(GLPS-AVG)，并分析LVEF与GLPS-LAX, GLPS-A4C, GLPS-A2C, GLPS-AVG的相关性。结果 LVEF正常组和LVEF降低组的年龄、心率、LVEDd和LVESd水平均显著高于对照组(均P<0.05)；LVEF降低组的LVEDd和LVESd水平显著高于LVEF正常组(均P<0.05)。LVEF正常组的LVEF水平低于对照组，但高于LVEF降低组，差异有统计学意义(P<0.05)。LVEF正常组和LVEF降低组的GLPS-LAX, GLPS-A4C, GLPS-A2C和GLPS-AVG参数水平(绝对值)均显著低于对照组(均P<0.05)；而与LVEF正常组比较，LVEF降低组的参数水平(绝对值)均显著低于对照组(均P<0.05)。Pearson相关分析结果显示，对照组LVEF正常组和LVEF降低组的LVEF与GLPS-LAX, GLPS-A4C, GLPS-A2C, GLPS-AVG均呈负相关(均P<0.05)。结论 房颤患者的LVEF在左室增大明显时才能出现异常，而AFI技术能更早地对左室收缩功能异常作出诊断，为房颤的早发现、早治疗提供技术支持。

【关键词】 二维超声心动图；自动功能成像；心房颤动；左室收缩功能

【中图分类号】 R 455.1  【文献标识码】 A  【文章编号】 1674-3806(2020)06-0587-05
doi:10.3969/j.issn.1674-3806.2020.06.11

Preliminary evaluation of left ventricular systolic function in patients with atrial fibrillation by two-dimensional echocardiography combined with automatic functional imaging technology  XU Juan, CHEN Qiu-lan, LI Xiao-xuan, et al. Department of Ultrasound, Huizhou First Hospital, Guangdong 516000, China

【Abstract】 Objective  To investigate the evaluating effect of two-dimensional echocardiography combined with automatic functional imaging(AFI) technology on left ventricular systolic function in patients with atrial fibrillation. Methods  Forty-one patients with atrial fibrillation admitted to our hospital from January 2016 to December 2019 were selected and were divided into the normal left ventricular ejection fraction(LVEF) group(LVEF≥50%，20 cases) and the LVEF-reduced group(LVEF<50%，21 cases)。Other twenty subjects undergoing routine physical examination were selected as the control group。Left ventricular end diastolic diameter(LVEDd)，left ventricular end systolic diameter(LVESd)，global longitudinal peak strain of apical long-axis(GLPS-LAX)，global longitudinal peak strain of apical four-chamber(GLPS-A4C)，global longitudinal peak strain of apical two-chamber(GLPS-A2C) and average global longitudinal peak strain(GLPS-AVG) were compared among the three groups。The correlation between LVEF and GLPS-LAX，GLPS-A4C，GLPS-A2C，GLPS-AVG was analyzed。Results  The age，heart rate，LVEDd and LVESd levels in the normal LVEF group and the LVEF-reduced group were significantly higher than those in the...
heart failure, including liver and kidney dysfunction, finally leading to heart failure. It is a common atrial arrhythmia of fast and irregular atrial rhythm. For patients with atrial fibrillation, only becoming evident when the left ventricles enlarge significantly, and AFI technology can diagnose the abnormal left ventricular systolic function earlier, providing technical support for the early detection and treatment of atrial fibrillation.

**Keywords**: Two-dimensional echocardiography; Automatic functional imaging (AFI); Atrial fibrillation; Left ventricular systolic function

Heart failure, which is common in patients with atrial fibrillation, is manifested by a rapid and irregular atrial rhythm. Over time, it can lead to heart failure, especially in patients with liver and kidney dysfunction. It is a common atrial arrhythmia that changes the heart's electrical activity significantly. For patients with atrial fibrillation, it only becomes apparent when the left ventricles enlarge significantly, and AFI technology can diagnose abnormal left ventricular systolic function earlier, providing technical support for early detection and treatment of atrial fibrillation.

**Methods**

**1. Object and Method**

1.1. Study Object

We enrolled 112 patients with atrial fibrillation, aged 32 to 87, with a mean age of 55.2 ± 12.4 years, who were divided into the atrial fibrillation group and the control group. The levels of LVEDd and LVESd in the LVEF-reduced group were significantly higher than those in the normal LVEF group (P < 0.05). The level of LVEF in the normal LVEF group was lower than that in the control group, but the level of LVEF in the normal LVEF group was higher than that in the LVEF-reduced group, and the differences were statistically significant (P < 0.05). The levels of GLPS-LAX, GLPS-A4C, GLPS-A2C, and GLPS-AVG parameters (absolute values) in the normal LVEF group and the LVEF-reduced group were significantly lower than those in the control group (P < 0.05). Compared with those in the normal LVEF group, the parameters (absolute values) in the LVEF-reduced group were significantly lower (P < 0.05). The results of Pearson correlation analysis showed that LVEF was negatively correlated with GLPS-LAX, GLPS-A4C, GLPS-A2C, and GLPS-AVG in the control group, the normal LVEF group, and the LVEF-reduced group (P < 0.05).

**Conclusion**

LVEF in patients with atrial fibrillation only becomes apparent when the left ventricles enlarge significantly, and AFI technology can diagnose the abnormal left ventricular systolic function earlier, providing technical support for early detection and treatment of atrial fibrillation.

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**Conclusion**

LVEF in patients with atrial fibrillation only becomes apparent when the left ventricles enlarge significantly, and AFI technology can diagnose the abnormal left ventricular systolic function earlier, providing technical support for early detection and treatment of atrial fibrillation.
AFI 技术评价左室心肌收缩力，分别显示心尖四腔观、心尖两腔观、心尖长轴观的三维纵向应变-时间曲线及 17 节段收缩期峰值应变图像。

① 对照组，显示左室整体及节段收缩峰值正常，颜色均匀，左室整体收缩期应变均值为-21.4%。② LVF 正常组，显示左室整体及节段收缩峰值减低，颜色差异明显，左室整体收缩期应变均值为-15.2%。③ LVF 降组，显示左室整体及节段收缩峰值减低更明显，颜色差异明显，左室整体收缩期应变均值为-12.4%。

图 1 AFI 检查图像所示

1.3 统计学方法 采用 SPSS19.0 统计软件进行数据分析。计量资料以均数 ± 标准差 (x±s) 表示，三组间比较采用单因素方差分析，采用 LSD 检验进行组间两两比较，采用 Pearson 相关分析法分析 LVF 与左室二维整体应变参数的相关性。P < 0.05 为差异有统计学意义。

2 结果

2.1 三组年龄、性别及二维超声的一般参数比较

表 1 三组年龄、性别及二维超声的一般参数比较 [(x±s), n]

<table>
<thead>
<tr>
<th>组 别</th>
<th>例数</th>
<th>性别</th>
<th>年龄 (岁)</th>
<th>心率 (次/分)</th>
<th>LVEDd (mm)</th>
<th>LVESt (mm)</th>
<th>LVEF (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVF 正常组</td>
<td>20</td>
<td>14</td>
<td>6</td>
<td>68.45 ± 12.89</td>
<td>88.95 ± 12.69</td>
<td>47.95 ± 3.61</td>
<td>31.95 ± 2.96</td>
</tr>
<tr>
<td>LVF 降低组</td>
<td>21</td>
<td>8</td>
<td>13</td>
<td>74.29 ± 9.75</td>
<td>90.05 ± 11.95</td>
<td>54.14 ± 6.05</td>
<td>43.80 ± 5.84</td>
</tr>
<tr>
<td>对照组</td>
<td>20</td>
<td>13</td>
<td>7</td>
<td>58.75 ± 9.27</td>
<td>80.85 ± 9.99</td>
<td>45.10 ± 2.85</td>
<td>28.65 ± 2.48</td>
</tr>
</tbody>
</table>

F/χ²: -

P: 0.083

注：与对照组比较，*P < 0.05；与 LVF 正常组比较，**P < 0.05

2.2 三组 GLPS-LAX, GLPS-A4C, GLPS-A2C 和 GLPS-AVG 参数比较

表 2 三组 GLPS-LAX, GLPS-A4C, GLPS-A2C 和 GLPS-AVG 参数比较 [(x±s), %]

<table>
<thead>
<tr>
<th>组 别</th>
<th>例数</th>
<th>GLPS-LAX</th>
<th>GLPS-A4C</th>
<th>GLPS-A2C</th>
<th>GLPS-AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVF 正常组</td>
<td>20</td>
<td>-15.17 ± 0.72</td>
<td>-15.06 ± 1.60</td>
<td>-14.33 ± 1.69</td>
<td>-15.26 ± 3.86</td>
</tr>
<tr>
<td>LVF 降低组</td>
<td>21</td>
<td>-11.09 ± 2.11</td>
<td>-9.49 ± 3.25</td>
<td>-10.34 ± 4.54</td>
<td>-9.73 ± 3.66</td>
</tr>
<tr>
<td>对照组</td>
<td>20</td>
<td>-22.5 ± 3.02</td>
<td>-20.56 ± 1.86</td>
<td>-22.06 ± 2.82</td>
<td>-20.99 ± 2.86</td>
</tr>
</tbody>
</table>

F: -

P: 0.000

注：与对照组比较，*P < 0.05；与 LVF 正常组比较，**P < 0.05

2.3 三组 LVEF 与 GLPS-LAX, GLPS-A4C, GLPS-A2C 和 GLPS-AVG 参数的相关分析结果

Pearson 相关分析结果显示，对照组、LVF 正常组和 LVF 降低组的 LVEF 与 GLPS-LAX, GLPS-A4C, GLPS-A2C, GLPS-AVG 参数相关性显著。
均呈负相关 \((P < 0.05)\)。见表3。

<table>
<thead>
<tr>
<th>组别</th>
<th>GLPS-LAX</th>
<th>GLPS-A4C</th>
<th>GLPS-A2C</th>
<th>GLPS-AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVEF正常组</td>
<td>(r = -0.467)</td>
<td>(-0.935)</td>
<td>(-0.681)</td>
<td>(-0.905)</td>
</tr>
<tr>
<td></td>
<td>(p = 0.038)</td>
<td>(0.000)</td>
<td>(0.001)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>LVEF降低组</td>
<td>(r = -0.566)</td>
<td>(-0.776)</td>
<td>(-0.808)</td>
<td>(-0.861)</td>
</tr>
<tr>
<td></td>
<td>(p = 0.009)</td>
<td>(0.000)</td>
<td>(0.000)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>对照组</td>
<td>(r = -0.939)</td>
<td>(-0.460)</td>
<td>(-0.471)</td>
<td>(-0.736)</td>
</tr>
<tr>
<td></td>
<td>(p = 0.000)</td>
<td>(0.042)</td>
<td>(0.036)</td>
<td>(0.000)</td>
</tr>
</tbody>
</table>

3 讨论

3.1 随着社会人口老龄化的发展，房颤的发病率日益增高，而脑卒中、心力衰竭等严重并发症的发生也使得房颤患者的致残率和病死率逐年上升，生活质量不佳。目前，临床对房颤患者的治疗目标已不仅限于控制心室率等，还越来越注重心脏整体结构及功能的变化。AFI技术可以反映心肌纤维缩短和伸长的能力，是评价心肌运动功能的新方法。

3.2 本研究结果显示，房颤患者中无论是LVEF正常或是降低，其左室内径均较对照组增大，而LVEF均较对照组降低，这是因为房颤发作时，心室率加快且不规则，交感神经系统与肾素-血管紧张素系统被激活，左室心肌纤维的正常顺序被打乱，心室顺应性降低，心室充盈压增高，左室重构，内径增大，心肌弹性和收缩能力下降，从而进一步诱发不同程度的左室收缩功能减低。尽管房颤患者与健康对照者相比，其左室内径增大，但此时LVEF正常组的左室内径，射血分数值在临床诊断中依然处于正常范围。因此，本研究应用AFI技术对LVEF正常和降低的患者进行了测量，发现LVEF正常组的GLPS-LAX、GLPS-A4C、GLPS-A2C和GLPS-AVG参数均低于对照组，说明对于部分房颤患者，尽管常规超声测量到心功能在正常范围，但心室收缩功能实际已经减低，提示常规的仅从左室容量的变化判断射血分数值不能早期反映心肌收缩特性的变化，这与Morris等的研究结果相一致。国内李清等的研究结果表明，应用斑点追踪技术评价LVEF正常的心力衰竭伴房颤患者的左室收缩功能时亦发现这类患者左室心肌节段收缩力及节段收缩同步性异常。故认为此时是收缩功能轻微受损，但还未引起明显收缩功能降低状态，是收缩功能早期损害的一个时期。

另外，本研究结果显示，LVEF降低组的左室内径明显增大，AFI显示其GLPS-LAX、GLPS-A4C、GLPS-A2C和GLPS-AVG参数水平显著低于对照组和LVEF正常组。综上所述，本研究的初步结果表明，房颤患者LVEF在左室明显增大时，射血分数值减低，血射分数值在临床诊断中依然处于正常范围，但心室收缩功能的异常丧失。LVEF低于正常值的患者，尽管房颤患者与健康对照者相比，常同时伴有高血压和冠心病，冠心病这一基本疾病，因此对于LVEF降低组中左室增大，射血分数值减低，但未引起明显收缩功能降低；AFI技术操作快速便捷，无需诉机分析，结合心电图，心内膜图像及心内膜膜功能异常，可方便应用于日常工作中。

参考文献

经阴道四维子宫输卵管超声造影与腹腔镜检查诊断输卵管通畅一致性分析

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基金项目：广西医药卫生科研课题（编号：Z20190652）

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【摘要】 目的 分析经阴道四维子宫输卵管超声造影(4D-HyCoSyr)与腹腔镜检查诊断输卵管通畅一致性并评价其应用价值。方法 选择2018年8月～2019年11月间该院接治的不孕症患者60例（共120条输卵管）作为研究对象。所有研究对象均接受经阴道4D-HyCoSyr检查和腹腔镜检查双重检查诊断输卵管状况，分析两种检查方法诊断输卵管通畅性的一致性。结果 腹腔镜检查显示输卵管通畅55条，通而不畅37条，阻塞28条；经阴道4D-HyCoSyr检查结果显示输卵管通畅58条，通而不畅35条，阻塞27条。两种方法检查结果具有高度一致性（Kappa = 0.908，P = 0.000）。输卵管通畅者，盆腔造影剂多呈均匀弥散（82.76%），以环状包绕卵巢为主（91.38%）；输卵管不通者，盆腔造影剂多呈不均匀弥散（88.57%），以半环状包绕卵巢为主（88.57%）；输卵管阻塞者，盆腔造影剂呈无弥散（100.00%），以无包绕卵巢为主（92.59%）。经阴道4D-HyCoSyr检查过程中造影剂盆腔弥散及卵巢包绕情况与输卵管通畅度具有关联性（P < 0.05）。结论 经阴道4D-HyCoSyr检查与腹腔镜下通液检查在输卵管通畅情况判断方面具有高度一致性，具有较高的临床应用价值。

【关键词】 输卵管；通畅性；腹腔镜；四维子宫输卵管超声造影