Radiofrequency ablation of numerous premature ventricular contractions in a cardiac resynchronisation therapy patient: a long-term follow-up

Ablacja prądem o wysokiej częstotliwości przedwczesnych pobudzeń komorowych u pacjenta z układem resynchronizującym: obserwacja odległa

Michał Mirosław Farkowski, Tomasz Chwyczko, Maciej Sterliński, Paweł Syska, Hanna Szwed, Mariusz Pytkowski
2nd Department of Coronary Artery Disease, Institute of Cardiology, Warsaw, Poland

Abstract
We present a case study of a patient with dilated cardiomyopathy and a cardiac resynchronisation therapy (CRT) device who was repeatedly hospitalised due to heart failure (HF) exacerbations. A successful radiofrequency ablation of numerous premature ventricular contractions enabled the proper action of CRT and stabilised the patient’s condition in NYHA II without HF subsequent hospitalisations during a 30 month follow-up.

Key words: cardiac resynchronisation therapy, catheter ablation, premature ventricular contractions

INTRODUCTION
While published studies have pointed out the favourable outcomes of radiofrequency ablation (RFA) of premature ventricular contractions (PVCs) in structurally normal hearts, there is less data on the management of frequent PVCs in patients with cardiac resynchronisation therapy (CRT) [1–11]. Also, there is no information on the long-term follow-up of such patients, since the longest published data covers only six months after RFA.

We present a 2.5 year follow-up of a patient with CRT who underwent RFA of numerous PVCs with excellent clinical results.

CASE REPORT
In 2006, a 69 year-old male with a history of dilated cardiomyopathy with heart failure (HF) in New York Heart Association (NYHA) class III with left bundle branch block underwent an implantation of CRT-D. Over the next three years, the patient developed atrial fibrillation, continuously deteriorated to HF NYHA class VI, despite optimal medical treatment and atrio-ventricular (AV) node ablation in 2008, and was hospitalised several times due to HF exacerbations. On tests, an exceptionally low proportion of biventricular pacing (BiV) was noticed (47–71%) accompanied by a high count of PVCs (Table 1).

In September 2009, the patient was again hospitalised due to HF exacerbation with signs of liver and kidney damage. CRT BiV count was 70% and ECG revealed a left ventricle outflow tract pattern of PVCs. Based on experience with RFA in a structurally normal heart, the RFA of PVCs was performed (Figs. 1–3). After successful RFA and the planning of a HF rehabilitation programme, the patient was discharged in a stable condition.

During 2.5 years of follow-up, there was no hospitalisation due to HF. The last follow-up visit took place in January 2013. Clinically, the patient stabilised in NYHA class II with BiV count > 95% and improvement in all tests (Table 1).
Radiofrequency ablation of numerous premature ventricular contractions in a CRT

Table 1. Heart failure NYHA class, echocardiography, 24-hour Holter ECG monitoring and cardiopulmonary exercise test results 2006–2011

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NYHA class</td>
<td>III</td>
<td>III/IV</td>
<td>III</td>
<td>II</td>
<td>IV/I</td>
</tr>
<tr>
<td>ECHO (EF%)</td>
<td>20</td>
<td>15</td>
<td>15</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Holter ECG (PVCs/day)</td>
<td>960</td>
<td>&lt; 31,000</td>
<td>&lt; 43,000</td>
<td>&lt; 100</td>
<td>&lt; 150</td>
</tr>
<tr>
<td>Peak oxygen uptake [mL/kg/min] (% predicted)</td>
<td>18.6 (84%)</td>
<td>n/a</td>
<td>12.3 (56%)</td>
<td>15.2 (72%)</td>
<td>16.8 (87%)</td>
</tr>
</tbody>
</table>

AV node — atrio-ventricular node; ECG — electrocardiography; ECHO — echocardiography; EF — ejection fraction; FU — follow-up; NYHA — New York Heart Association; n/a — not available; PVCs — premature ventricular complexes

Figure 1. Waveform depicting numerous premature ventricular complexes consistent with a left ventricle outflow tract pattern and unsuccessful biventricular stimulation before radiofrequency application (speed 13 mm/s)

Figure 2. Disappearance of premature ventricular complexes after radiofrequency ablation with proper biventricular stimulation (speed 13 mm/s)
DISCUSSION

PVCs are an uncommon but potentially curable cause of nonresponse to CRT and repeated exacerbations of HF. The probable underlying mechanism is both low percentage of BIV pacing and detrimental effect of the arrhythmia itself, seen even in hearts without structural disease [2–8]. The first prospective evaluation of RFA of PVCs in CRT was published in 2012. Patients were ablated and prospectively followed for six months to assess the echocardiographical response to CRT [11]. The authors concluded that a PVC burden greater than 22% was related to a favourable outcome of RFA, but they expressed concern about the long-term effect of the procedure. In our case, the PVC’s burden varied between 30–40% and an astonishing improvement in clinical status after RFA, followed by disease stabilisation and no subsequent HF hospitalisations, was maintained during a very long 2.5-year observation.

CONCLUSIONS

RFA may be a useful tool in situations of nonresponse to CRT in case of selected arrhythmias. The favourable outcome of this treatment may be stable in long-term observation.

Funding: Institute of Cardiology
Conflict of interest: none declared

References