

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

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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

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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).

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

	Baseline (2006)	AV node ablation (2008)	PVCs ablation (2009)	3-month FU (2009)	20-month FU (2011)
NYHA class	III	III/IV	III	II	II/I
ECHO (EF%)	20	15	15	20	20
Holter ECG (PVCs/day)	960	< 31,000	< 43,000	< 100	< 150
Peak oxygen uptake [mL/kg/min] (% predicted)	18.6 (84%)	n/a	12.3 (56%)	15.2 (72%)	16.8 (87%)

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

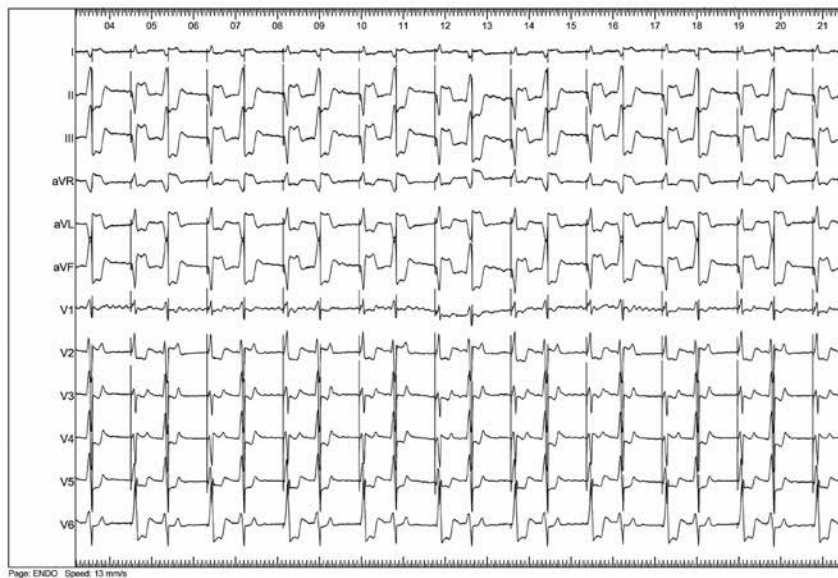


Figure 1. Waveform depicting numerous premature ventricular complexes consistent with a left ventricle outflow tract pattern and unsuccessful biventricular stimulation before radiofrequency application (speed 13 mm/s)

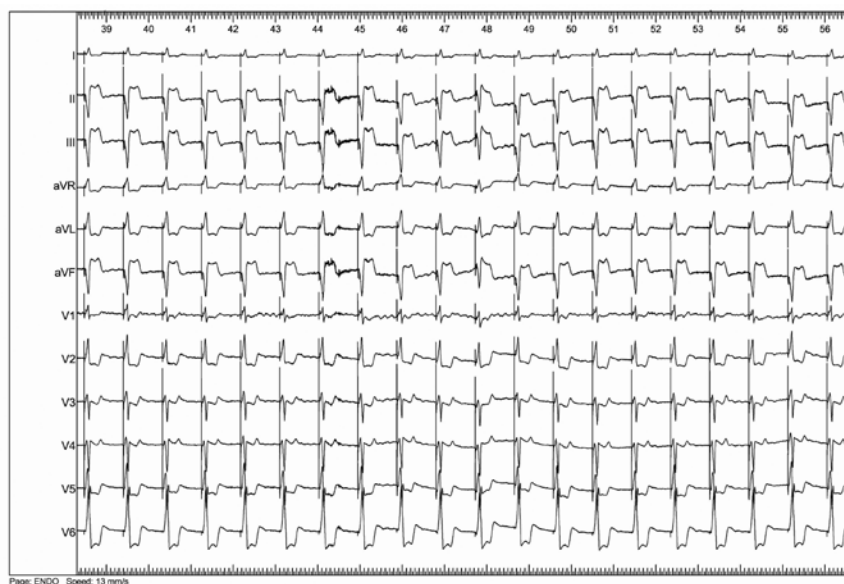


Figure 2. Disappearance of premature ventricular complexes after radiofrequency ablation with proper biventricular stimulation (speed 13 mm/s)

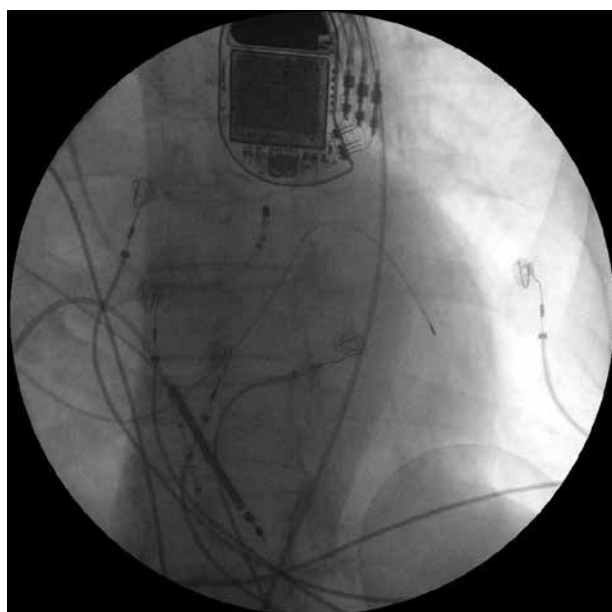


Figure 3. Ablation site in fluoroscopy (30° left anterior oblique view). Notice two cardiac resynchronisation therapy leads: implantable cardioverter defibrillator in right ventricle and left ventricle lead in postero-lateral vein; two electrophysiological catheters: 4-pole diagnostic catheter in right ventricle and mapping catheter in left ventricle outflow tract

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.

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Conflict of interest: none declared

References

1. Zipes D, Camm A, Borggrefe M et al. ACC/AHA/ESC 2006 guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death: a report of the American College of Cardiology/American Heart Association Task Force and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Develop guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death) developed in collaboration with the European Heart Rhythm Association and the Heart Rhythm Society. *Europace*, 2006; 8: 746–837.
2. Takemoto M, Yoshimura H, Ohba Y et al. Radiofrequency catheter ablation of premature ventricular complexes from right ventricular outflow tract improves left ventricular dilation and clinical status in patients without structural heart disease. *J Am Coll Cardiol*, 2005; 45: 1259–1265.
3. Yarlagadda R, Iwai S, Stein K et al. Reversal of cardiomyopathy in patients with repetitive monomorphic ventricular ectopy originating from the right ventricular outflow tract. *Circulation*, 2005; 112: 1092–1097.
4. Bogun F, Crawford T, Reich S et al. Radiofrequency ablation of frequent, idiopathic premature ventricular complexes: comparison with a control group without intervention. *Heart Rhythm*, 2007; 4: 863–867.
5. Taieb J, Maury P, Shah D et al. Reversal of dilated cardiomyopathy by the elimination of frequent left or right premature ventricular contractions. *J Interv Card Electrophysiol*, 2007; 20: 9–13.
6. Kanei Y, Friedman M, Ogawa N et al. Frequent premature ventricular complexes originating from the right ventricular outflow tract are associated with left ventricular dysfunction. *Ann Noninvasive Electrocardiol*, 2008; 13: 81–85.
7. Omichi C, Tanaka T, Kakizawa Y et al. Improvement of cardiac function and neurological remodeling in a patient with tachycardia-induced cardiomyopathy after catheter ablation. *J Cardiol*, 2009; 54: 134–138.
8. Pytkowski M, Maciag A, Jankowska A et al. Quality of life improvement after radiofrequency catheter ablation of outflow tract ventricular arrhythmias in patients with structurally normal heart. *Acta Cardiol*, 2012; 67: 153–159.
9. Oreziak A, Przybylski A, Walczak F. Ventricular bigeminy as a cause of CRT inefficacy and inappropriate cardioverter-defibrillator intervention [in Polish]. *Kardiologia Pol.* 2009; 67: 807–811.
10. Herczku C, Kun C, Edes I, Csanadi Z. Radiofrequency catheter ablation of premature ventricular complexes improved left ventricular function in a non-responder to cardiac resynchronization therapy. *Europace*, 2007; 9: 285–288.
11. Lakkireddy D, Di Biase L, Ryschon K et al. Radiofrequency ablation of premature ventricular ectopy improves the efficacy of cardiac resynchronization therapy in nonresponders. *J Am Coll Cardiol*, 2012; 60: 1531–1539.