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Atrioventricular junction ablation as a bridging treatment of tachycardiomyopathy and renal insufficiency in the course of atrial fibrillation with high frequency ventricular rhythm

Ablacja łącza przedsionkowo-komorowego jako terapia pomostowa tachykardiomiopatii i niewydolności nerek w przebiegu migotania przedsionków z szybkim rytmem komór

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Abstract

We present the case of a 67 year-old woman with tachycardiomyopathy induced by atrial fibrillation with high frequency ventricular response. The patient underwent resynchronisation pacemaker implantation and atrioventricular junction ablation as a bridging therapy prior to cryoballoon pulmonary vein ostia ablation.

Key words: tachycardiomyopathy, atrial fibrillation, junction ablation, bridging therapy

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Introduction

Cardiomyopathy-induced arrhythmia is an important cause of cardiac insufficiency. However, the heart damage it causes is potentially reversible. One of the arrhythmias that can lead to tachycardia is atrial fibrillation (AF) with a rapid ventricular rhythm. There are several treatments to control both the type of rhythm and the rate of ventricular rhythms in patients with atrial fibrillation: pharmacotherapy, cardioversion, and ablation. Invasive procedures are undoubtedly the most effective in both the long- and the short-term. Both pulmonary vein ablation and atrioventricular junction ablation with implantation of a pacemaker system are extremely effective in this regard. Hybridising the two treatments can be an unusual practical solution.

Case report

A 67 year-old woman with no history of cardiovascular disease was referred to the Department of Cardiology of the Regional Hospital due to her first-ever clinically apparent AF episode. Despite the use of full antiarrhythmic treatment, *i.e.* full dose beta-blocker, amiodarone, digitalis, and calcium channel blockers in the initial phase, ventricular rhythm could not be returned to acceptable values. She presented with heart palpitations and symptoms of severe heart failure in New York Heart Association (NYHA) classes III and IV. Left ventricular ejection fraction (LVEF) decreased to 37%, functional mitral regurgitation aggravated to severe, progressive enlargement of left atrial (LA) artery eventually reached 39 cm^2 and left ventricular diastolic diameter 4.7 cm, impairment of right ventricular systolic function with

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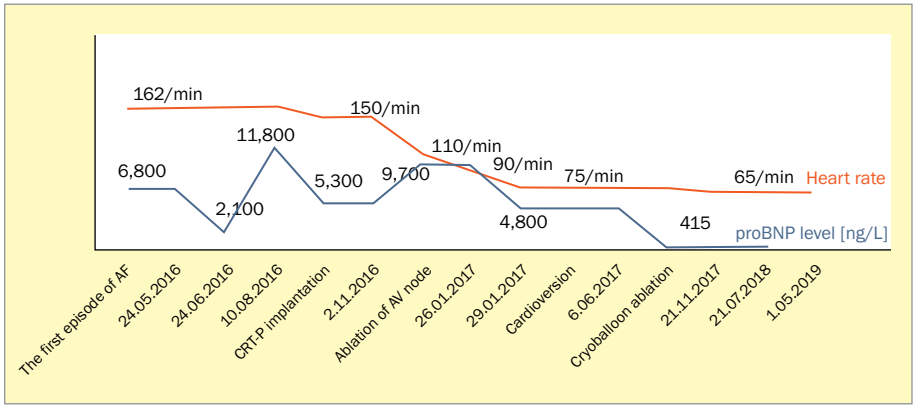

Figure 1. Average frequency of ventricular rhythm and pro-B-type natriuretic peptide (proBNP) level during course of treatment; AF — atrial fibrillation; CRT-P — cardiac resynchronisation therapy with pacemaker; AV — atrioventricular

lowest tricuspidal annular plane systolic excursion (TAPSE) of 1.3 cm, and the deteriorating renal function prevailed with a lowest glomerular filtration rate (GFR) of 23.4 mL/min/1.73 m^2. Secondary causes of AF and lack of ventricular rate control were excluded. Despite adequate anti-clotting treatment, the patient had a thrombus in the left atrial appendage, which persisted despite the intensification of treatment, making it impossible to perform both electrical cardioversion and ablation of AF. Despite the pharmacological treatment, her condition deteriorated significantly, the symptoms of cachexia due to cardiac insufficiency started to develop, and the level of pro-B-type natriuretic peptide (proBNP) reached over 11,000, while creatinine increased to 2.22 mg/dL (Figure 1). Considering the above, she was qualified for cardiac resynchronisation therapy with a pacemaker (CRT-P) with subsequent atrioventricular junction ablation as an alternative to control the ventricular rate. Unfortunately, no successful stimulation was achieved on the whole course of the posterior and postero-lateral cardiac veins. Ultimately a 'left chamber' electrode was implanted into the anterior vein of the heart. After the wound healing process and the confirmation of proper pacemaker function, an atrioventricular ablation procedure was performed, resulting in a very rapid improvement of the patient's clinical status: a reduction of NYHA class symptoms, a decrease in creatinine level to 1.19 mg/dL, a systolic LVEF increase to 55%, a decrease in LA size, mitral regurgitation improved to mild, a decrease of pro-BNP, and a gradual cessation of cachexia. The frequency of ventricular stimulation in the VVIR BiV mode with an initial output of 110 bpm was gradually reduced to 70 bpm.

Nevertheless, NYHA II class symptoms persisted. A control transoesophageal study found that a previously observed thrombus in the left atrial appendage had resolved. Electrical cardioversion was performed, obtaining restoration of sinus rhythm and a further improvement of the patient's condition, resolution of circulatory insufficiency, and a further decline of pro-BNP. Thus, the patient was qualified to pulmonary veins isolation, and a cryoballoon ablation was performed. Amiodarone was discontinued after the successful procedure. For more than 24 months thereafter she has had no AF episodes, something which has been confirmed by CRT-P event tracking. The symptoms of circulatory failure have disappeared, creatinine level has dropped to 0.79 mg/dL, mitral regurgitation has improved to small, enlargement of LA to 35 cm^2 persists, and N-terminal pro-B-type natriuretic peptide (NT-proBNP) levels remain low.

Discussion

There are many arrhythmias responsible for inducing tachycardiomyopathy. The best form of treatment, if possible, is to remove the arrhythmia [1–5]. Effective treatment of arrhythmia usually results in complete resolution of left ventricular dysfunction [1]. An early drop in NT-proBNP level, reduced symptoms after the restoration of sinus rhythm, initially smaller left ventricular diastolic size, and a lack of late enhancements in magnetic resonance imaging (MRI) are all positive predictors of the total reversibility of ventricular dysfunction [2].

In the case in question, due to the presence of a thrombus in the left atrial appendage despite aggressive antithrombotic treatment, directly targeted restoration of sinus rhythm, such as pulmonary veins isolation or rhythm cardioversion, was impossible. The circulation improvement obtained due to ablation of the atrioventricular junction contributed undoubtedly to the resolution of the previous thrombus. Because it was unclear whether the residual symptoms of heart failure were the effect of suboptimal stimulation, electric cardioversion of persistent AF was performed. Due to the high risk of AF recurring in patients

with arrhythmia-induced cardiomyopathy, a risk that is associated with the poor prognosis of this group [5], the patient underwent cryoballoon pulmonary veins isolation.

It is worth noting that the treatment described resulted in normalisation of left ventricle function, inverse left atrium remodelling, withdrawal of mitral regurgitation, resolution of right ventricular systolic insufficiency, significantly decreased pro-BNP, and normalised creatinine level.

Undoubtedly, in view of the increasing availability of His bundle pacing, such a procedure, especially in relation to the suboptimal position of the 'left chamber' pacing electrode, might have been a better solution.

Conflict(s) of interest

The authors declare no conflict of interest.

Streszczenie

W pracy przedstawiono przypadek 67-letniej chorej z tachykardiomiopatią w przebiegu migotania przedsionków z szybkim rytmem komór leczoną implantacją stymulatora resynchronizującego i ablacją łącza przedsionkowo-komorowego jako terapią pomostową przed krioablacją balonową ujść żył płucnych.

Słowa kluczowe: tachykardiomiopatia, migotanie przedsionków, ablacja łącza przedsionkowo-komorowego, terapia pomostowa

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References

1. Twidale N, Sutton K, Bartlett L, et al. Effects on cardiac performance of atrioventricular node catheter ablation using radiofrequency current for drug-refractory atrial arrhythmias. Pacing Clin Electrophysiol. 1993; 16(6): 1275–1284, doi: 10.1111/j.1540-8159.1993.tb01714.x, indexed in Pubmed: 7686657.
2. Nia AM, Gassanov N, Dahlem KM, et al. Diagnostic accuracy of NT-proBNP ratio (BNP-R) for early diagnosis of tachycardia-mediated cardiomyopathy: a pilot study. Clin Res Cardiol. 2011; 100(10): 887–896, doi: 10.1007/s00392-011-0319-y, indexed in Pubmed: 21538234.
3. Hunter RJ, Berriman TJ, Diab I, et al. A randomized controlled trial of catheter ablation versus medical treatment of atrial fibrillation in heart failure (the CAMTAF trial). Circ Arrhythm Electrophysiol. 2014; 7(1): 31–38, doi: 10.1161/CIRCEP.113.000806, indexed in Pubmed: 24382410.
4. Khan MN, Jaïs P, Cummings J, et al. PABA-CHF Investigators. Pulmonary-vein isolation for atrial fibrillation in patients with heart failure. N Engl J Med. 2008; 359(17): 1778–1785, doi: 10.1056/NEJMoa0708234, indexed in Pubmed: 18946063.
5. Di Biase L, Mohanty P, Mohanty S, et al. Ablation versus amiodarone for treatment of persistent atrial fibrillation in patients with congestive heart failure and an implanted device: results from the AATAC multicenter randomized trial. Circulation. 2016; 133(17): 1637–1644, doi: 10.1161/CIRCULATIONAHA.115.019406, indexed in Pubmed: 27029350.
6. Nerheim P, Birger-Botkin S, Piracha L, et al. Heart failure and sudden death in patients with tachycardia-induced cardiomyopathy and recurrent tachycardia. Circulation. 2004; 110(3): 247–252, doi: 10.1161/01.CIR.0000135472.28234.CC, indexed in Pubmed: 15226218.