POLISH HEART JOURNAL

Kardiologia Polska
The Official Peer-reviewed Journal of the Polish Cardiac Society since 1957

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ISSN 0022–9032 e-ISSN 1897–4279

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Authors: Krzysztof Myrda, Wiktor Czarkowski, Anna Kazik, Aleksandra Błachut, Agata Kukfisz, Mariusz Gąsior

Article type: Clinical vignette

Received: September 29, 2024

Accepted: October 23, 2024

Early publication date: Novemver 5, 2024

Cryoballoon pulmonary vein isolation in a patient with atrial fibrillation and cardiogenic shock, and a high probability of severe tachyarrhythmic cardiomyopathy

Krzysztof Myrda[1, 2], Wiktor Czarkowski[1], Anna Kazik[1], Aleksandra Błachut[1], Agata Kukfisz[1], Mariusz Gąsior[1, 2]

[1]2nd Department of Cardiology and Angiology, Silesian Centre for Heart Diseases, Zabrze, Poland
[2]3rd Department of Cardiology, Faculty of Medical Sciences in Zabrze, Medical University of Silesia, Katowice, Poland

Correspondence to:
Krzysztof Myrda MD, PhD,
2nd Department of Cardiology and Angiology,
Silesian Center for Heart Diseases,
Skłodowskiej-Curie 9, 41–800 Zabrze, Poland,
phone: +48 32 373 38 60,
e-mail: k_myrda@interia.pl

We describe a case of a 47-year-old male transferred from a district cardiology department with the symptoms of refractory cardiogenic shock (CS). In the weeks preceding the current hospitalization, progression of heart failure (HF) was observed, which resulted in the development of extremely severe HF. Laboratory tests performed in the referring department showed negative myocardial necrosis markers and inflammatory parameters. Echocardiography revealed significantly impaired left ventricular systolic function (LVEF) with end-diastolic and end-systolic dimensions, respectively: 63/57 mm, as well as moderate left atrial enlargement (LAVi 38 ml/m^2). At the same time, it hasn't been demonstrated any significant valvular defects or pathological fluid in the pericardial space (Figure 1B). Significant coronary artery disease was ruled out. In addition to typical treatment and pressure amines, temporary intra-aortic counterpulsation balloon support was needed. On admission, the patient presented with persistent atrial fibrillation (AF) with rapid ventricular rate (Figure 1A) and the symptoms of HF requiring temporary support with intravenous dobutamine infusion. Due to persistent symptoms of CS, amiodarone was used ineffectively and electrical cardioversion briefly

restored sinus rhythm (SR). Short-term ventricular rate control was achieved with a continuous infusion of landiolol. At that time, a cardiac MRI study showed no features of myocarditis or other structural myocardial disease. An LVEF of 10% was confirmed (Figure 1C). The "Heart Team" performed percutaneous AF ablation under the care of the cardiac surgery team with the possibility of emergency access to circulatory support. Accordingly, pulmonary vein isolation by cryoablation was performed in the typical fashion and was assisted by the anesthesia team. Arrhythmia interruption occurred intraoperatively. After sustained restoration of SR, the patient's condition improved significantly during the follow-up. The pressor amines were reduced and finally discontinued. The clinical improvement and the increase in LVEF to 25% already during hospitalization confirmed a severe form of tachyarrhythmic cardiomyopathy. Six months after the procedure, the patient remained free of any arrhythmias and HF symptoms. At that time, the LVEF was 46% (Supplementary material, *Video S1*).

Atrial fibrillation is the most common cause of tachyarrhythmic cardiomyopathy [1]. Permanent restoration of SR by percutaneous ablation should be the treatment of choice. In addition to an increase in LVEF, the risk of re-hospitalization for worsening HF symptoms and death of any cause is reduced [2].

To date, few cases of therapeutic ablation in patients in CS due to AF have been reported [3]. Doubts about the eligibility arise from an unclear clinical picture indicating the tachyarrhythmic background. Furthermore, the risk of adverse events associated with the procedure is higher and increases with lowering LVEF. Invasive methods of cardiovascular support may be helpful intraoperatively [4]. However, they also increase the risk of complications. The solution could be AV node ablation or urgent qualification for heart transplantation. However, pulmonary vein isolation remains a therapeutic option due to the limitations of both therapeutic approaches, given the overall clinical condition and the lack of left atrial dilatation. Preference should be given to shortening the procedure time by performing cryo-isolation of the pulmonary veins [5]. The choice of source energy differed from the descriptions available in the literature that favored radiofrequency ablation [3].

Supplementary material

Supplementary material is available at https://journals.viamedica.pl/polish_heart_journal.

Article information

Conflict of interest: None declared.

Funding: None.

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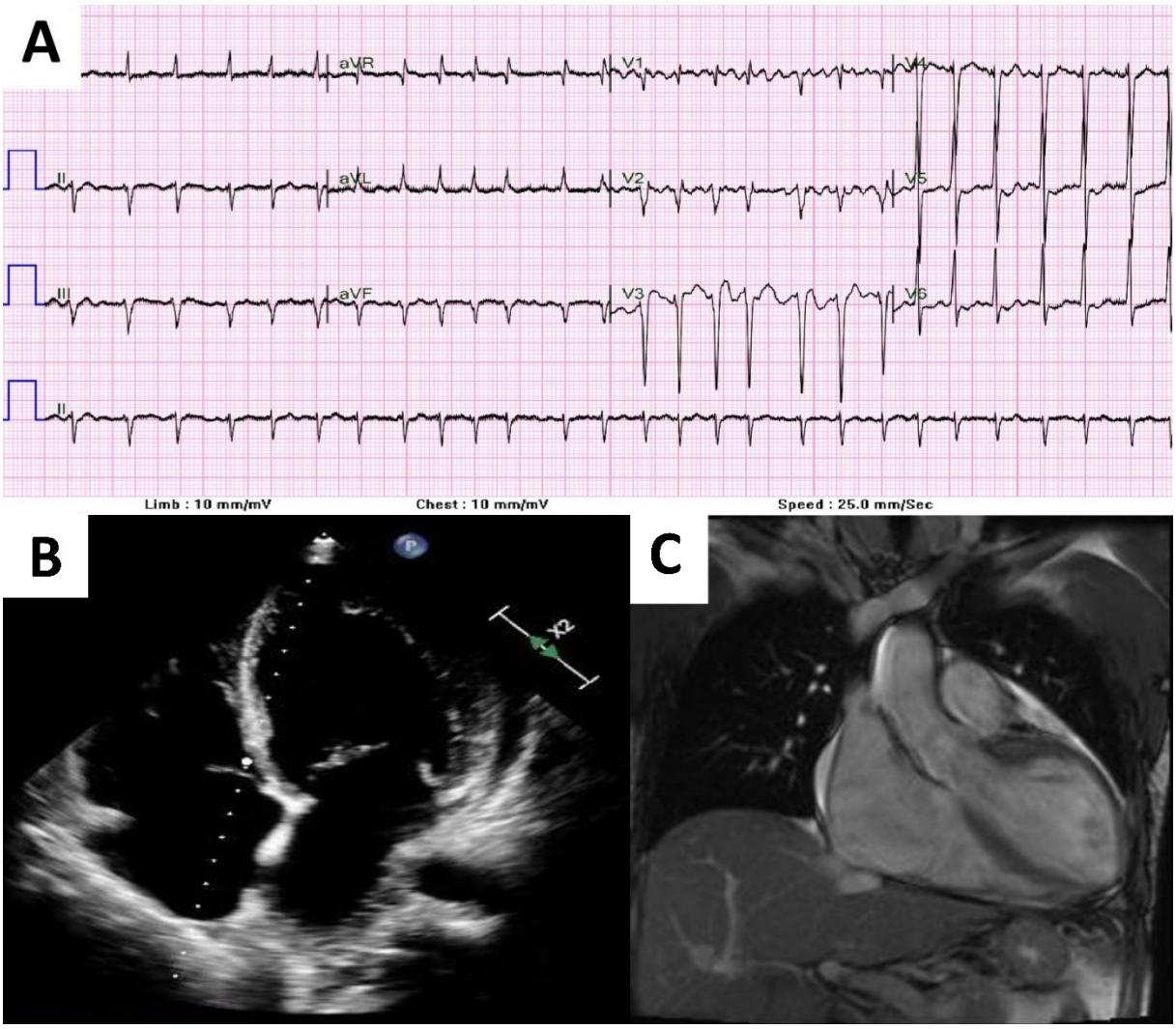

Figure 1. A. Electrocardiogram performed on admission showing atrial fibrillation with rapid ventricular rate. **B.** Echocardiography ruled out valvular and pericardial disease; otherwise, it showed impaired left ventricular systolic function and moderate left atrial enlargement. **C.** Cardiac magnetic resonance imaging screen excluding structural myocardial disease