A wearable cardioverter-defibrillator vest as a diagnostic and therapeutic tool after COVID-19

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DOI: 10.33963/KP.a2023.0128

Received:
March 5, 2023

Accepted:
April 26, 2023

Early publication date:
May 30, 2023

A 29-year-old female patient, previously in excellent health, presented with recurrent fainting caused by ventricular tachyarrhythmia three months after contracting COVID-19. An ambulatory Holter ECG showed a brief episode of non-sustained ventricular tachycardia (nsVT) at a rate of 270 bpm, which coincided with the presyncope (Figure 1A). The patient's resting ECG was normal, and an electrophysiology study did not reveal inducible arrhythmia. Additionally, a cardiac magnetic resonance (CMR) scan did not demonstrate features of myocarditis (Figure 1B, Supplementary material, *Video S1*).

However, during hospitalization, the patient experienced recurrent nsVT, indicating increased vulnerability to sustained ventricular arrhythmia (Figure 1D). It was assumed that this arrhythmia was related to recent COVID-19 infection and would likely resolve spontaneously. To monitor and treat the arrhythmia, the patient was offered a wearable cardioverter-defibrillator (WCD) instead of an implantable cardioverter-defibrillator (ICD). The patient was started on bisoprolol and electrolyte replacement, received education and training on using the WCD, and was subsequently discharged home (Figure 1C). The next day, the patient was readmitted with an electrical storm recorded by the WCD. The patient experienced 11 episodes of ventricular tachycardia with a cycle length ranging from 220 to 240 milliseconds and a duration varying from 40 to 220 seconds, including five episodes occurring at intervals of at least 5 minutes (Figure 1E–F). The patient did not lose consciousness during the electrical storm episodes and was able to abort the high-voltage therapy by simultaneously pressing two buttons on the WCD unit (Supplementary material, *Text S2*). The arrhythmia was successfully treated with amiodarone infusion.

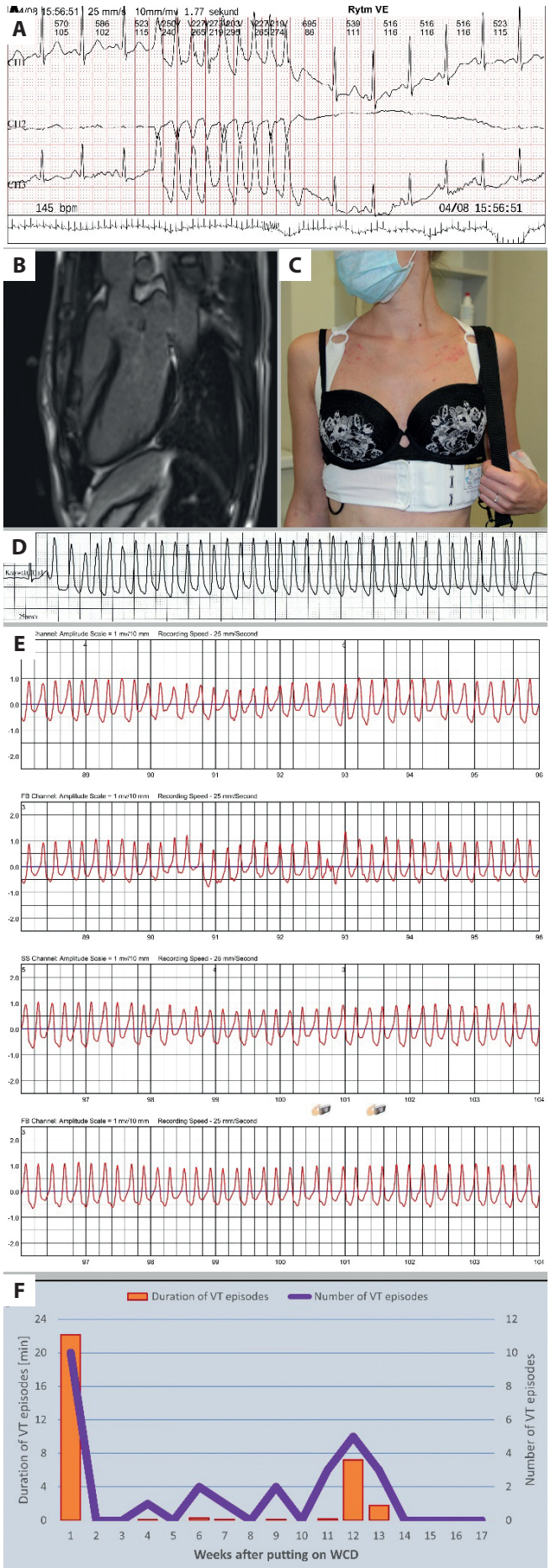
Additionally, an ablation procedure was performed (Supplementary material, *Text S3*).

Six weeks later, the patient experienced another episode of an electrical storm which was recorded by the WCD. The patient was treated at the Emergency Department with oral propafenone and electrolyte replacement. The patient was admitted electively four months later to reassess the need for a WCD or ICD.

Holter ECG showed 286 single ventricular ectopics and one pair. The arrhythmia frequency in the WCD memory was down-trending (Figure 1F). Given the reduction of the arrhythmia, the WCD treatment was discontinued. However, due to uncertainty surrounding the post-COVID-19 arrhythmia, an ICD implantation was offered but not accepted by the patient. In the 14-month follow-up, the patient remained well with no reported syncope or palpitations.

In young women, myocarditis has been reported as one of cardiac complications of COVID-19, and it has been associated with increased risk of sudden cardiac death (SCD) [1, 2] (Supplementary material, *Text S4*).

We observed a decrease in the arrhythmia burden during follow-up, indicating a self-limiting course of the disease. Using a WCD as a bridge therapy can be an effective temporary solution in cases where the patient is at risk of SCD but is not yet a candidate for a permanent ICD implantation [3]. In this case, the WCD was a valuable diagnostic and therapeu-



tic tool to prevent SCD [4]. Eventually, the arrhythmia resolved, and the patient decided not to have an ICD implanted, which, in hindsight, turned out to be the right decision, and the patient was not burdened with unnecessary therapy. This case highlights the importance of a shared decision-making process between the healthcare provider and the patient, where the patient's values, preferences, and concerns are taken into account when making treatment decisions. In summary, we believe the WCD is a valuable option for patients with ventricular arrhythmia in the setting of recent SARS-CoV-2 infection and myocarditis.

Supplementary material

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

Article information

Conflict of interest: None declared.

Funding: None.

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Figure 1. A. Ambulatory Holter electrocardiography (ECG) monitoring: episodic non-sustained ventricular tachycardia (nsVT) at a rate of 270 bpm. **B.** Cardiac magnetic resonance: three chamber long-axis apical view of the left ventricle. Late gadolinium enhancement imaging indicates no post-inflammatory lesions with normal global left and right ventricular systolic function. **C.** The patient wearing a wearable cardioverter defibrillator. **D.** ECG monitoring during hospitalization (record from the bedside monitor): an approximately 8-second episode of nsVT. **E.** Trace of one of the ventricular tachycardia episodes (the pictograms show the moments when two buttons on the device are pressed simultaneously to interrupt the high-voltage therapy). **F.** Trend of arrhythmia burden over the follow-up period (number of episodes and their duration)