

Electrocardiogram recording vest: A useful tool in explaining recurrent syncope

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Finding the underlying cause of recurrent unexplained syncope is often exhaustive work requiring many diagnostic measures. One of these is the prolonged electrocardiographic monitoring necessary to observe a correlation between the symptoms and electrocardiogram (ECG) abnormalities and therefore confirm arrhythmic syncope [1–3]. Current guidelines recommend considering Holter monitoring in patients who have frequent syncope or presyncope (≥ 1 per week) or external loop recorder (ELR), early after the index event, in patients who have an inter-symptom interval ≤ 4 weeks [4]. ELR devices can work as an event recorder activated by a patient shortly after an incident or as continuous recording.

One of the available ELR devices is the Comarch CardioVest ECG recording vest (Fig. 1) [5]. The vest itself is light, easy to wear, and created from biocompatible, non-allergenic materials. It comes in variable sizes fitting patients with chest circumference from 70 to 129 cm. The device allows recording ECG signals due to the usage of special textile electrodes. The technology enables continuous ECG monitoring up to 30 days, with two independent recorders carried interchangeably — each recording up to 24 h. While one of the recorders is in use, the other one set in dock transmission station automatically sends records to a telemedicine platform.

Implemented algorithms automatically detect crucial heart arrhythmias such as pauses,

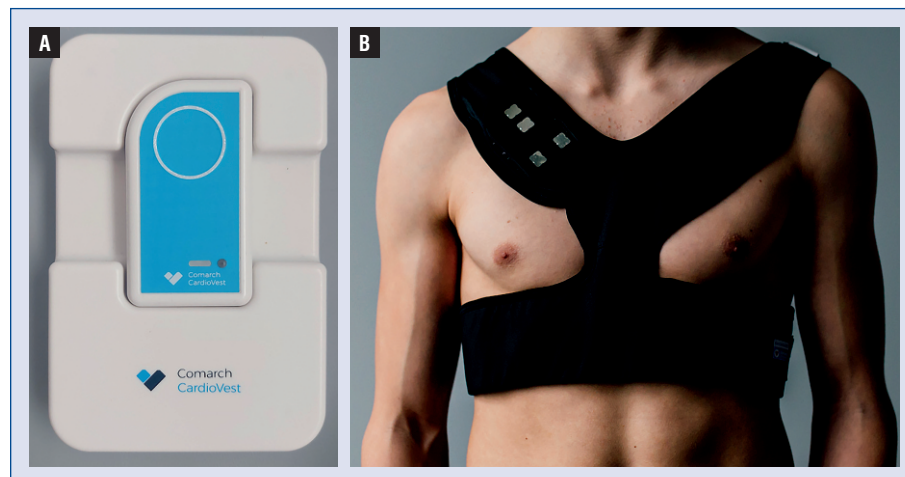


Figure 1. The Comarch CardioVest system; **A.** An electrocardiogram (ECG) recorder in dock transmission station; **B.** A vest that allows to properly attach and use the ECG recorder.

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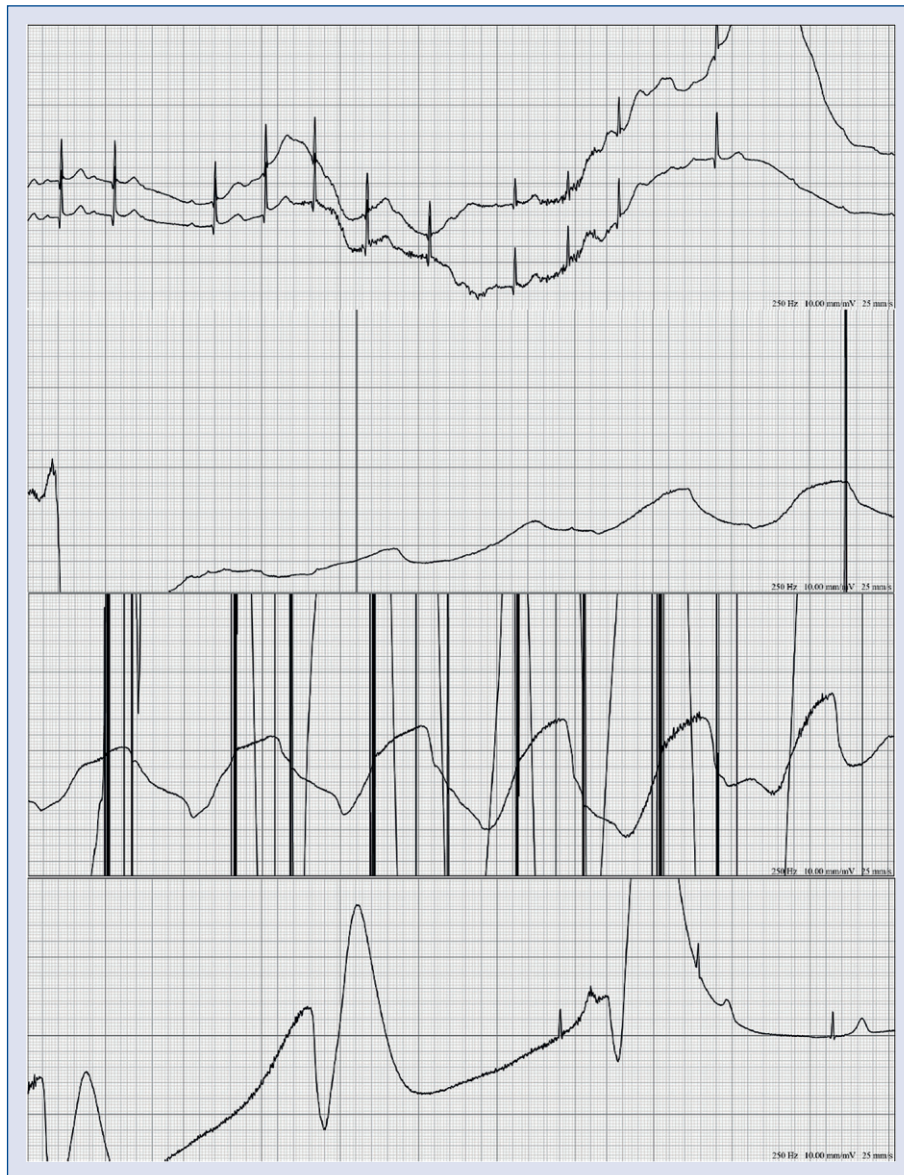


Figure 2. Elements of the 79 second pause recorded using CardioVest, Comarch.

ventricular tachycardia, atrial fibrillation (AF), or bradycardia, as well as minimal and maximal heart rate. Authorized medical personnel with access to the telemedicine platform can verify the automatic analysis, add significant ECG findings to daily reports or perform manual analysis in a case when the automatic one is not satisfactory. This solution significantly shortens monitoring of long-term ECG monitoring and allows day-by-day analysis in the case of symptoms.

Presented herein is the case of a 41-year-old woman with paroxysmal AF, with a history of cerebral ischemic stroke and percutaneous patent foramen ovale closure 3 years prior, who had been

diagnosed for syncopal and presyncopal episodes since childhood. The CardioVest system has had an essential role in making a proper diagnosis in the presented case. The incidents of syncope and presyncope occurred once or twice a year, mainly after standing upright or a strong sensation of pain. They were not associated with episodes of AF or hypotonia, but were preceded by prodromal symptoms such as chest tightness, limb paresthesia, nausea and vertigo. Current pharmacotherapy (apixaban 5 mg b.i.d.) was well tolerated for many years and did not require escalation — no incidents of AF were recorded in the previous 5 years. Resting ECG showed no abnormalities.

Two head-up tilt tests were performed 4 years prior — the first one was negative, the second one was negative in the passive phase, but after nitroglycerin administration paroxysmal 3rd degree atrioventricular block (AVB) with following sinus arrest was recorded — the pause exceeded 3 s.

However, further ECG monitoring which included 7-day standard Holter ECG and event Holter ECG did not record any spontaneous arrhythmias. The patient did not consent to the implantation of a loop recorder. Due to the rare frequency of symptoms, the analysis performed with ELR was necessary — use an ECG recording vest was decided upon (CardioVest, Comarch).

Prolonged electrocardiographic monitoring revealed sinus rhythm with an average rate of 60–70 bpm and episodes of 2nd degree AVB 2:1, advanced block 3:1 and 3rd degree block were recorded. Moreover, the patient reported episodes at the time of the monitoring — one presyncope, associated with the 2nd degree and advanced AVB and one syncope, associated with an episode of complete AVB with following sinus arrest with a total pause of 79 s (Fig. 2). Additionally, the recording shows artifacts which may correspond to a seizure. Both episodes occurred at daytime, between 8 AM and 10 AM and were preceded by similar prodromal symptoms. The device did not report the occurrence of AF.

The recording of the episode allowed for qualification of the patient to implantation of the dual-chamber pacemaker, which resulted in no further episodes of syncope in the following years.

Prolonged continuous ECG monitoring is essential in recognizing the arrhythmical cause

of syncope. Using the ECG recording vest is non-invasive, easy to perform, and allows day-by-day online analysis to reveal the fast correlation between clinical symptoms and ECG findings. We believe the ECG recording vest may become one of the standard diagnostic tools of unexplained syncope of potential arrhythmic origin.

Conflict of interest: None declared

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