

Electrical cardioversion performed by an emergency team without a doctor in pre-hospital conditions.



Rafał Waćkowski¹, Arkadiusz Wejnarski^{1,2}  ORCID <https://orcid.org/0000-0003-1454-6664>

¹ Polish Medical Air Rescue, Warsaw, Poland

¹ Department of Nursing and Emergency Medicine, Siedlce University of Natural Sciences and Humanities, Siedlce, Poland

ADDRESS FOR
CORRESPONDENCE:

Rafał Waćkowski,
Polish Medical Air Rescue,

ul. Księżycowa 5
01-934 Warszawa;
e-mail: waciak@mp.pl

ABSTRACT

Tachyarrhythmias are often the cause of hemodynamic instability causing a life-threatening condition. The recommended procedure is to perform urgent electrical cardioversion. Chosen medical emergency systems all over the world make it possible for medical rescuers to perform this procedure in pre-hospital conditions. The analyzed case presents a 75-year-old patient with ventricular tachycardia leading to a cardiogenic shock. The quick recognition and implementation of the proceedings by the rescue team without a doctor turned out to be effective at the place of the event.

KEY WORDS: Tachyarrhythmia, ventricular tachycardia, cardioversion, emergency medical service, paramedic.

INTRODUCTION

Electrical cardioversion is a long-term therapeutic treatment for hemodynamically unstable ventricular and supraventricular tachycardia [1]. Moderation of life-threatening tachyarrhythmias is a life-saving procedure even in pre-hospital conditions. [2] However, due to the diverse medical emergency systems in the world, not all types of rescue teams have adequate training and qualifications to perform it [3]. The case analysis refers to a team without a doctor who, at the scene, evaluated the patient's condition, implemented analgosedation and performed electrical cardioversion with ventricular tachycardia.

CONTENT OF THE CALL

On 7 September 2017 at 20:14, a medical rescue team with two medical rescuers in the depot was sent to a small town in central Poland. The trip was given the urgency code 2 indicating the departure of the lower category. The requesting person has reported to the dispatcher such symptoms as diarrhea and headaches. The distance to the place of the incident was 16 kilometers. At 20:15, the ambulance went to the place of the accident. During the journey, the witnesses of the incident urged the summons because there was chest pain and the patient fainted. The medical dispatcher has changed the urgency code to 1 - using signals. Travel time totaled 19 minutes.

TREATMENT

A 75-year-old patient in a medical history three days earlier was discharged from a surgical ward, where he was hospitalized due to deep vein thrombosis with the recommended use of Xarelto 2 x 15 mg per day. Chronically treated for hypertension, type 2 diabetes mellitus treated orally, rheumatoid arthritis and generalized atherosclerosis. Puzzled by the rescuers, sweaty, tangled in a physical examination of consciousness disorder (GCS 13 points), significant psychomotor slowdown, cold skin. A horizontal position has been used while maintaining airway patency. Respiration rate 24 / minute, no visible respiratory effort, SpO2 not determinable, auscultatory symmetrical murmur over the pulmonary fields. Systolic blood pressure (BP) was 60 mmHg, diastolic impossible to hear. The heart action is fast, measured about 240 / minute. Pulse on the radial artery is absent. Capillary recession over 5 seconds. The level of

glycemia tested was 371 mg%. In palpation, the belly is soft, tender in the middle epigastrium, without peritoneal symptoms. Peristalsis audible, correct.

Passive oxygen therapy was used and during the first intravenous access the first electrocardiogram record of the limb leads was made, recognizing tachycardia with wide QRS (ventricular tachycardia - VT) unstable in haemodynamics. Because paramedics in Poland since 2016 have the power to perform electrical cardioversion alone, the team immediately proceeded to the procedure. Self-adhesive therapy electrodes (QUICK-COMBO type) were used. Fentanylum 50 µg and Midazolam 5 mg iv were selected for analgo-sedation. Pain response and ciliary reflexes were achieved. The first cardioversion energy was selected at 120 J, according to the guidelines of the European Resuscitation Council (ERC) 2015 and the recommendations of the equipment manufacturer. [4] The synchronized discharge turned out to be effective (Figure 1) and the rhythm conversion from VT to AF (atrial fibrillation) was obtained.

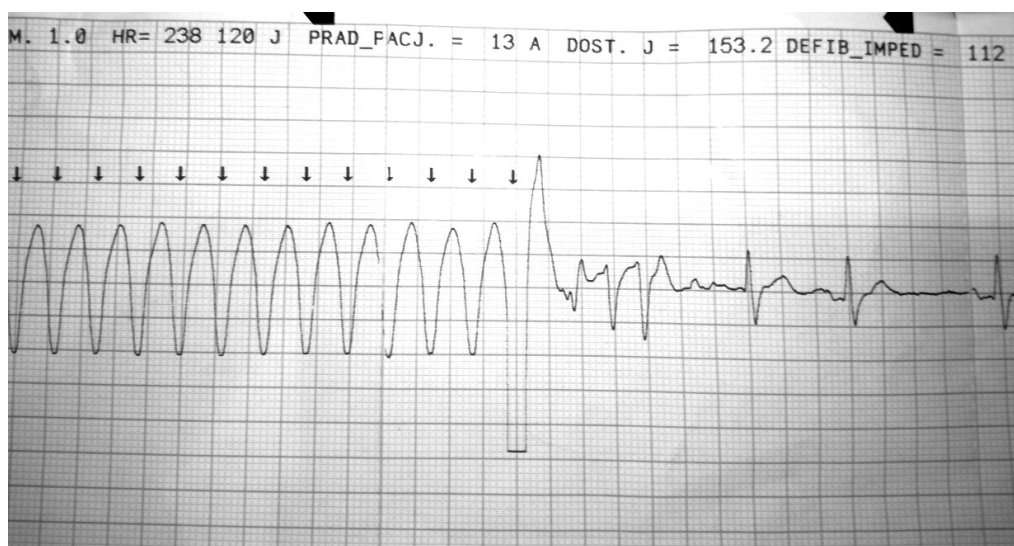


Figure 1. Conversion of rhythm due to cardioversion.

In the secondary study, the effectiveness of the procedure and cardiac output was confirmed to 90 / minute haemodynamically viable (BP = 100/70 mmHg). Passive oxygen therapy was continued maintaining airway patency (SpO₂ = 96%) and ECG recording with features of AF and myocardial ischemia (Figure 2). After the ECG teletransmission and consultations with the hemodynamics laboratory, the patient was not qualified for urgent coronary angiography, therefore the patient was transported to the nearest emergency department.

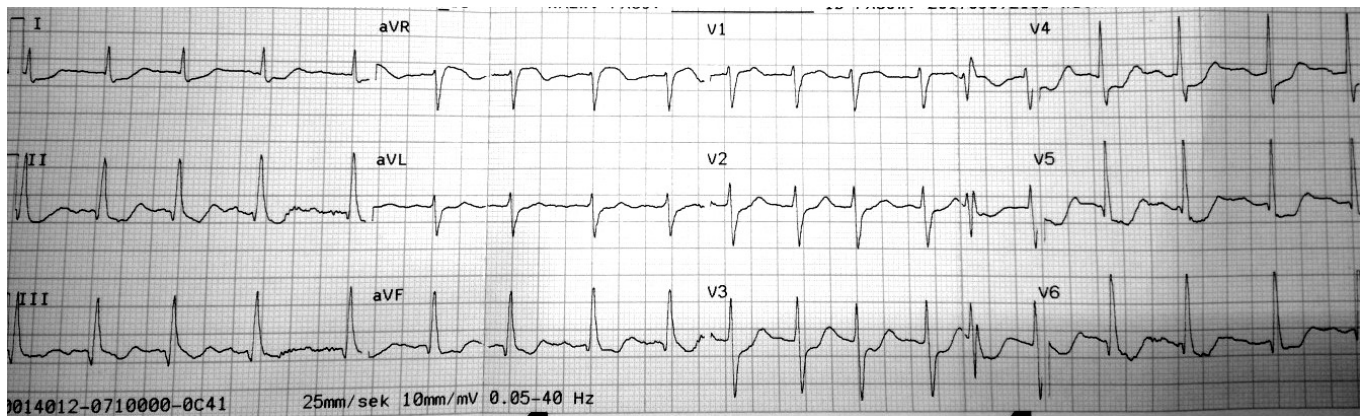


Figure 2. Conversion of rhythm due to cardioversion.

DISCUSSION

Electrical cardioversion is an effective method of terminating life-threatening tachycardia. According to the guidance algorithm, the ERC is the treatment of choice in patients with hemodynamic instability. The analyzed case confirms the effectiveness of the procedure performed by emergency teams without a doctor. Analgosedation of the opioids and benzodiazepines available to the paramedic was sufficient to achieve the optimal therapeutic effect.

The rapid progressive decompensation of the patient's circulation was the reason for the witnesses of the incident to contact the dispatcher on the phone again, which contributed to changing the urgency of the ambulance's departure. Applying for the life parameters assessed on the spot, the patient could not survive transport to the hospital or waiting for a team with a doctor. The correct diagnosis and immediate treatment of tachyarrhythmias in the performance of paramedics proves to be effective and may help to reduce sudden cardiac arrests in the course of hemodynamically unstable tachycardia [5].

Disclosure statement

No potential conflict of interest was reported by the author's.

REFERENCES

- [1] Nolan JP, Soar J, Zideman DA, Biarent D, Bossaert LL, Deakin C, et al. European resuscitation council guidelines for resuscitation 2010 section 1. Executive summary. *Resuscitation* 2010; 81(10): 1219-1276. doi: <http://dx.doi.org/10.1016/j.resuscitation.2010.08.021>
- [2] Kanz KG, Kay MV, Biberthaler P, Russ W, Lackner CK, Mutschler W. Effect of digital cellular phones on tachyarrhythmia analysis of automated external defibrillators. *Eur J Emerg Med* 2004; 11: 75–80.
- [3] Mandell MB. Covering models for two-tiered emergency medical services systems. *Location Science* 1998; 6(1-4): 355-368. doi: [http://dx.doi.org/10.1016/S0966-8349\(98\)00058-8](http://dx.doi.org/10.1016/S0966-8349(98)00058-8)
- [4] Soar J, Nolan JP, Böttiger BW, Perkins GD, Lott C, Carli P, et al.. European resuscitation council guidelines for resuscitation 2015: section 3. Adult advanced life support. *Resuscitation* 2015; 95: 100-147. doi: <http://dx.doi.org/10.1016/j.resuscitation.2015.07.016>
- [5] Weisfeldt ML, Everson-Stewart S, Sitlani C, Rea T, Aufderheide TP, Atkins DL, et al.. Ventricular tachyarrhythmias after cardiac arrest in public versus at home. *N Engl J Med*. 2011; 364(4): 313-321. doi: <http://dx.doi.org/10.1056/NEJMoa1010663>