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Authors: Agnieszka Reichert, Antoni Wileczek, Sebastian Stec

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Cardioneuroablation for the effective treatment of recurrent vasovagal syncope to restore driving abilities

Agnieszka Reichert[1], Antoni Wileczek[2], Sebastian Stec[2]

[1]Department of Cardiology, Regional Specialist Hospital, Stalowa Wola, Poland
[2]Division of Cardiac Electrophysiology, Cardioneuroablation, Ablation and Pacing, Subcarpathian Centre of Cardiovascular Interventions, Department of Cardiology, Sanok, Poland

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Correspondence to:
Agnieszka Reichert, MD,
Department of Cardiology, Regional Specialist Hospital in Stalowa Wola,
Staszica 4, 37–450 Stalowa Wola, Poland,
phone: +48 15 843 31 35,
e-mail: agarei@mp.pl

Approximately half of general population will have one syncopal event during their lifetime and the most frequent cause of it is reflex syncope. Recurrent syncope may significantly worsen the quality of life and may have serious consequences for traffic safety. According to European Society of Cardiology (ESC) guidelines published in 2018, patients with reflex syncope, which is recurrent, severe or taken place while driving, are advised not to drive until successful treatment is established [1].

Cardioneuroablation (CNA), which decreases vagal tone and modifies circulatory system reflexes, was an effective treatment in our patient before driving abilities restoration [1–4].

Our patient was a 56-year-old man with 8 syncopal episodes over a period of 6 months. His first loss of consciousness occurred while driving a car and ended with car collision. The other episodes took place at home, mainly in a standing position. He was hospitalized 3 times without any disturbances detected except mild hypertension. After life-threatening syncope, according to ESC guidelines and polish law, the patient was informed about contraindications to drive until proper diagnosis and treatment was established [1]. He accepted restriction, so there was

no need to issue an official steatement. Syncope while driving a car and a high frequency of episodes resulted in symptoms of depression requiring pharmacotherapy.

Our patient had a tilt table test done with syncope in the seventh minute after sublingual nitroglycerin sensitization, which was caused by a sinus pause lasting 19 seconds (Figure 1A). He was diagnosed as vasovagal syndrome type cardioinhibitory II B according to Vasovagal Syncope International Study. He also underwent a breathing test, Valsalva maneuver, carotid sinus massage with no abnormalities and atropine test, which resulted in an increase of heart rate from 71 to 121 bpm and shown him as appropriate responder to CNA. Before he was referred for CNA, cardiac pacing was considered (class IIb recommendation of ESC guidelines) [1]. Since there are conflicting results of randomized trials including patients with dual-chamber pacing for the treatment of cardioinhibitory vasovagal syncope and following the patient's preferences, CNA was recommended [5].

Anatomically-guided biatrial and binodal CNA with bilateral extracardiac vagal nerve stimulation (ECANS) was performed under general anesthesia according to Pachon et al. [6] . After basic electrophysiological study with normal parameters and three-dimensional electroanatomical mapping of the atria and pulmonary veins (Figure 1B), ultrasound-guided ECANS was done, which revealed sinus arrest lasting 11.5 seconds. Afterwards, radiofrequency applications were performed in the regions of parasympathetic innervation of the heart. Control ECANS did not reveal sinus arrest.

Eight weeks later control procedure was done. During right ECANS sinus pause lasting 11 seconds occurred and RF applications of the parasympathetic ganglia were repeated. Denervation was confirmed pharmacologically by administration of 2 mg intravenous atropine (sinus rhythm increased from 80 to 85 bpm at 10 minutes — <7%).

Three months later he underwent a tilt table test and control ECANS with any abnormalities.

According to the ESC guidelines, the patient was allowed to drive a car again after receiving effective treatment [1]. At 30-month follow-up the patient remains asymptomatic also while driving, his mental health improved so he no longer requires antidepressants and he supports other patients after CNA procedure.

Our case shows the usefulness of CNA as an effective and improving quality of life treatment with respect for social functioning by driving ability restoration.

Nevertheless, further research on this method is required.

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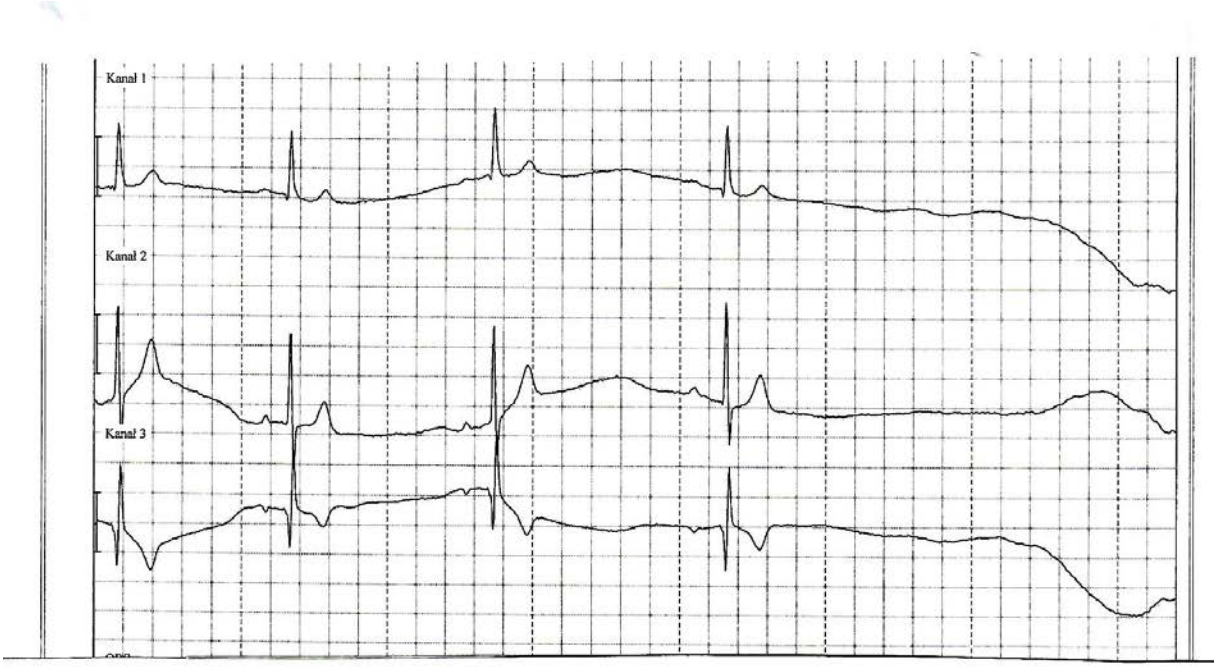

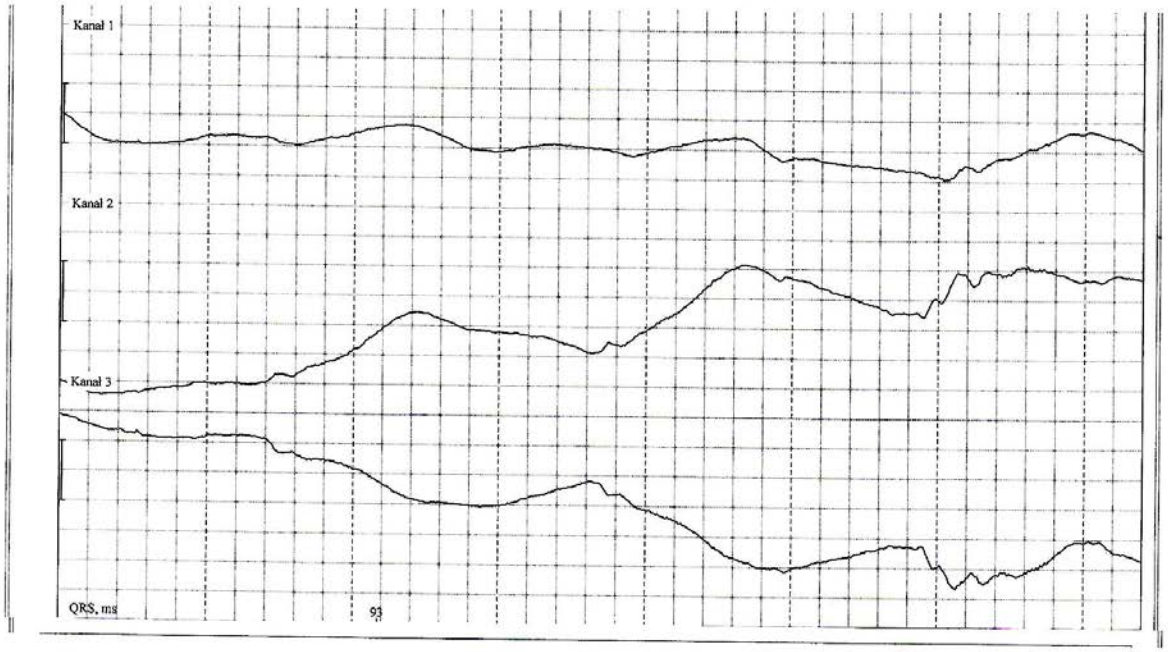

Figure 1. A. Electrocardiogram monitoring during head-up tilt test after sublingual nitroglicerin sensitization-the pause causing syncope

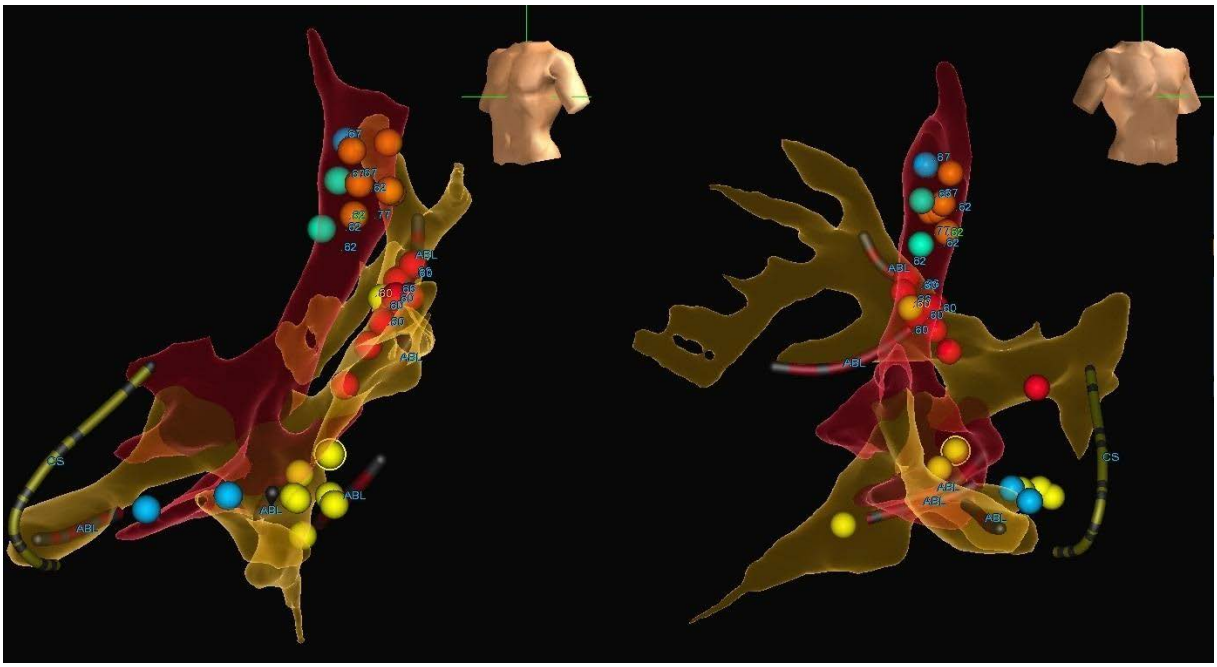

Figure 1. B. Electroanatomical map in depicting ablation sites. CS — shadow of decapolar catheter on tricuspid annulus. Blue dots indicate points with His EGM registration or phrenic nerve stimulation. Red, yellow and orange dots indicate ablation points in the right superior pulmonary vein, the ostium of the coronary sinus, and superior vena cava, respectively. Numbers indicate the highest registered sinus rate during applications