

# Exercise-Induced Ventricular Fibrillation: Seven Years Follow-Up

Gökmen Gemici<sup>1</sup>, Refik Erdim<sup>2</sup>, Ahmet Oktay<sup>3</sup>

<sup>1</sup>Department of Cardiology, Faculty of Medicine, Namık Kemal University, Tekirdağ, Turkey

<sup>2</sup>Department of Cardiology, Faculty of Medicine, İstanbul Science University, Florence Nightingale Hospital, İstanbul, Turkey

<sup>3</sup>Department of Cardiology, Faculty of Medicine, Marmara University, İstanbul, Turkey

## ABSTRACT

We present a 7-year follow-up of a 55-year-old male who experienced ventricular fibrillation during the recovery period of exercise testing and refused implantation of an ICD. Normal left ventricular systolic function was found on echocardiographic examination, and coronary angiography revealed only a side branch disease with a vessel diameter of less than 2 millimeters. The patient was discharged on metoprolol and ASA in addition to his previous treatment with lisinopril and simvastatin. Outpatient cardiac evaluation by repeated 24-hour ECG monitorizations (Holter) revealed normal findings. On follow up visits every six months for the past seven years, the patient was found to be asymptomatic.

**Key Words:** Ventricular fibrillation, exercise test

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## Introduction

Ventricular fibrillation (VF) in an asymptomatic patient without significant left ventricular dysfunction is an extremely rare complication of exercise testing. Data on the long term prognosis of such patients are inconclusive. We present a seven years follow-up of a 55-year-old male who experienced VF at the fourth minute of the recovery period.

## Case Report

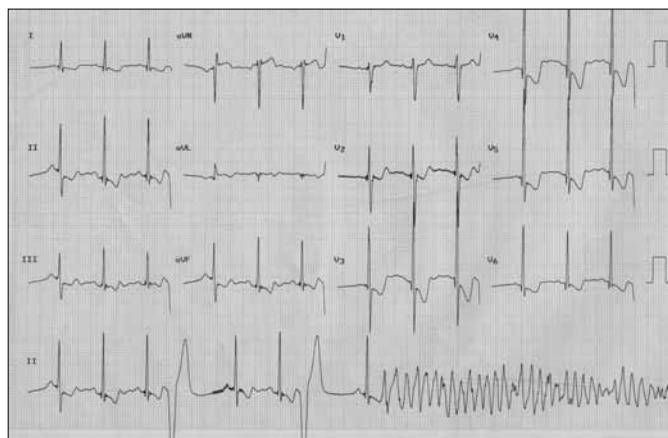
A 55-year-old asymptomatic male with cardiovascular risk factors was referred to our clinic for exercise testing. The patient reached stage 4 of the standard Bruce protocol (1) and a target heart rate of 165/minute. He did not have angina or rhythm disturbance during the test. A downsloping ST segment depression exceeding 2 mm developed in leads V4 to V6 at stage 4 while the patient was asymptomatic. Following the exercise, VF developed at the fourth minute of the recovery period (Figure 1). After successful defibrillation, sinus rhythm was maintained and the patient was admitted to the coronary care unit. During the follow up at the coronary care unit, the patient remained in sinus rhythm, and cardiac troponin T levels were found in the normal range at repeat measurements. The ECG documented the QT interval within normal limits. Mild concentric hypertrophy (interventricular septum: 12 mm) with normal left ventricular systolic function was found on echocardiographic examination. A coronary angiography was performed and revealed a significant stenosis at the first diagonal branch of the left anterior descending artery, which was not appropriate for revascularisation due to

the vessel diameter of less than 2 mm. The remaining coronary arteries were normal. Implantation of an ICD with a diagnosis of resuscitated cardiac arrest was planned, but the patient refused any non-pharmacological treatment. The patient was therefore advised not to perform vigorous exercise and was discharged on metoprolol and ASA in addition to his previous treatment with lisinopril and simvastatin. Outpatient cardiac evaluation by repeated 24-hour ECG monitorizations (Holter) revealed normal findings. On follow up visits every six months for the past seven years, the patient has remained asymptomatic.

## Discussion

Exercise test in the setting of various structural disorders of the cardiovascular system is associated with an increased complication rate (1). After ruling out all these high-risk features in addition to electrolyte imbalance, long QT syndrome, Brugada syndrome and right ventricular dysplasia by clinical observation, repeated measurements of Troponin T levels, serial ECGs, 24-hour Holter monitoring, echocardiography and coronary angiography, we reached a diagnosis of "exercise-induced VF in the absence of significant structural heart disease" which is in line with "catecholaminergic idiopathic ventricular fibrillation" (CVF) (2).

CVF is an uncommon form of catecholaminergic ventricular tachycardia (CVT), which has been defined as ventricular fibrillation elicited by physical or emotional stress in the absence of identifiable precipitating factors and in the absence of ventricular tachycardia documented at Holter and/or exercise stress testing (3-5). The arrhythmias are not usually inducible with programmed ventricular stimulation, however



**Figure 1. Premature ventricular beats followed by ventricular fibrillation at the fourth minute of the recovery period**

they are reproducibly induced by the exercise stress test (3, 5). Our patient did not have a positive family history of exercise-induced syncope or sudden death. Based on current knowledge, genetic analysis does not contribute to risk stratification, although it may help identify silent carriers of CVT-related mutations (6).

Beta-blockers are generally effective in patients with CVT in preventing recurrences of syncope (5, 7). In addition to beta-blocker therapy, ICD implantation is usually recommended for patients who have had an episode of VF, although we currently do not have clear data for the prognosis and possible benefits of ICD implantation in patients without significant structural heart disease (3, 4). Our patient has been followed for 7 years, and do not have symptoms under metoprolol. He does not perform vigorous exercise and still refuses any non-pharmacological treatment, possibly due to the dire event occurred during the exercise test seven years previously.

The presence of coronary artery disease risk factors in asymptomatic persons is not a strong indication for exer-

cise testing (1). Fortunately the patient, who had no previous symptoms, survived a documented exercise-induced VF. Rare but potentially fatal complications of exercise testing should be considered when the indication is not clear.

### Conflict of Interest

No conflict of interest was declared by the authors.

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