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Case Report

Precordial ST-segment elevation triggered by treadmill exercise test in a sedentary patient

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ABSTRACT

Treadmill exercise test is a widely used noninvasive test for evaluation of coronary artery disease due to cost and availability. Although the incidence of complications related to the test is low, physicians should be careful in patient selection for it. In particular, it should be recommended and performed cautiously in patients with a sedentary lifestyle. Herein, we present a patient with a sedentary lifestyle who developed asymptomatic precordial ST segment elevation.

<Learning objective: Treadmill test should be recommended and performed cautiously in patients with a sedentary lifestyle.>

Introduction

Exercise-induced ST-segment elevation is a relatively uncommon problem in clinical practice; its prevalence depends upon the population tested, but occurs more frequently in patients who have had a myocardial infarction [1]. The mechanisms have been suggested to result from left ventricular wall motion abnormalities, left ventricular aneurysm, coronary artery stenoses and, less commonly, from coronary vasospasm [2]. Herein, we present the case of a patient with a sedentary lifestyle who developed asymptomatic precordial ST segment elevation during treadmill exercise test.

Case report

A 41-year-old sedentary male patient with no previous cardiovascular risk factors was admitted to our department with exertional dyspnea for 2 months. His family history was unremarkable. Examination revealed normal systemic findings. Initial electrocardiography (ECG) showed normal sinus rhythm with no ischemic changes (66 bpm). Transthoracic echocardiography demonstrated normal systolic and diastolic functions with no segmentary wall motion abnormality. He underwent a treadmill exercise test for non-invasive evaluation of coronary artery disease. At the beginning of the test, resting ECG showed sinus rhythm with no ischemic changes (Fig. 1A). Although the patient was asymptomatic throughout the exercise test, ECG revealed ST segment elevation in V_{1-5} leads (3–4 mm) and reciprocal ST segment depression in II, III, and aVF derivations (3 mm) at the 10th minute (Bruce Stage 4) of the exercise (Fig. 1B). The exercise test was terminated immediately and recovery phase was initiated. He also had no symptoms thereafter. Recovery phase ECG showed continuation of ST segment elevation in V_{1-3} derivations with reciprocal changes again (Fig. 1C). The patient was observed in the emergency room. Aspirin, clopidogrel, statin, and heparin infusion were initiated immediately. Also glycerol trinitrate infusion was initiated to exclude the probability of coronary spasm. But there was <50% resolution in ST segment elevation with no symptoms. So, the patient was transferred to the catheterization laboratory immediately. Coronary angiography revealed a significant lesion at the proximal segment of the left anterior descending artery (LAD) (Fig. 2A). Percutaneous transluminal coronary angioplasty and stent implantation were performed to the LAD lesion with no residual stenosis (Fig. 2B and C). Control ECG just after percutaneous intervention revealed sinus rhythm with no ST segment elevation (Fig. 3). The patient was hospitalized for 2 days. Cardiac biomarkers were within normal limits. He was discharged uneventfully on the 2nd day. He was asymptomatic at 2-year follow up.

Discussion

Treadmill exercise test is a frequently used noninvasive and inexpensive method [3] for evaluation of ECG changes due to myocardial ischemia [4–6]. Exercise-induced ST-segment elevation is a relatively rare problem in patients without prior myocardial infarction. The mechanisms have been suggested to result from left ventricular wall motion abnormalities, left ventricular

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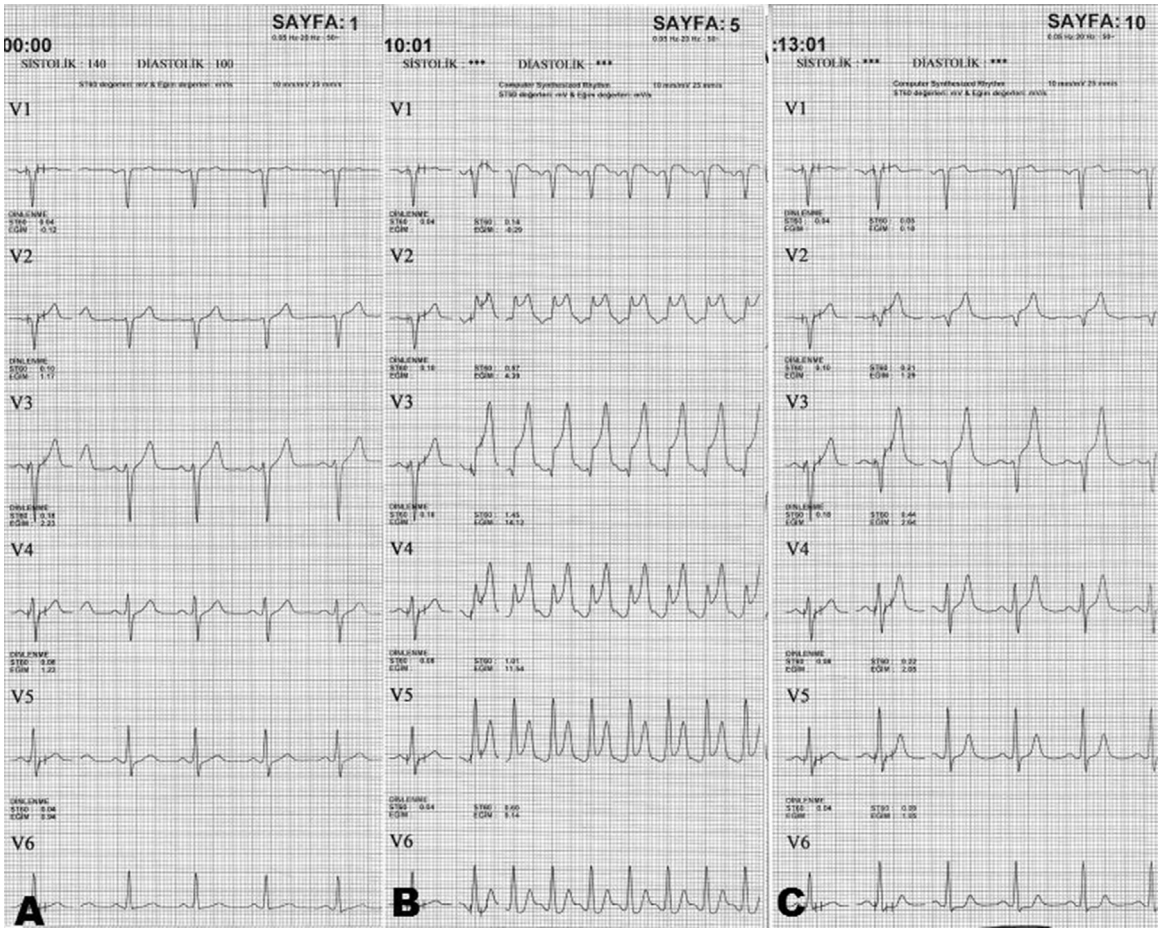

Fig. 1. (A) Electrocardiography before exercise showing normal sinus rhythm with no ST segment changes. (B) At Bruce stage 4, electrocardiography showing ST segment elevation in V_{1-5} leads (3–4 mm) and reciprocal ST segment depression in II, III, and aVF derivations (3 mm). (C) Recovery phase electrocardiography showed continuation of ST segment elevation in V_{1-3} derivations with reciprocal changes again.

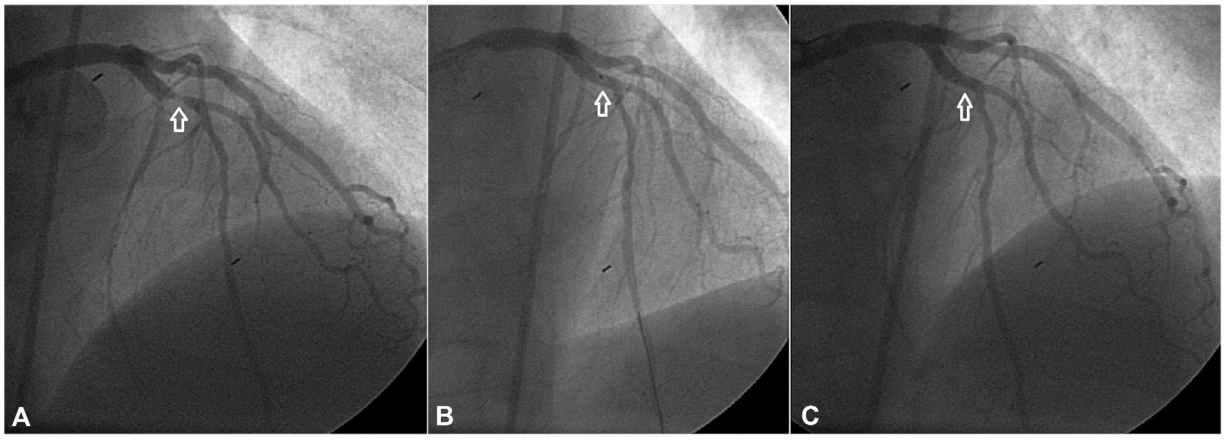

Fig. 2. (A) Coronary angiography revealed significant stenosis at proximal segment of left anterior descending artery (arrow). (B) Bare metal stent implantation was performed to the stenotic segment (arrow). (C) Final flouroscopic view showing successful angiographic result with no residual stenosis (arrow).

aneurysm, coronary artery stenosis and, less frequently, from coronary vasospasm. When occurring purely during exercise, coronary lesions are frequent and often severe, on the other hand ST-segment elevation of the recovery phase is frequently associated with normal arteries or less severe lesions [7]. Also, it should be suspected cautiously, especially in sedentary patients. Acute stress with strong exercise during treadmill exercise test may trigger plaque rupture or coronary spasm in sedentary patients without any known cardiovascular risk factor, like in our patient.

In conclusion, due to cost and availability, treadmill exercise test is widely used as a non-invasive test for evaluation of coronary artery disease. However, it should be performed cautiously in patients with a sedentary lifestyle. Physical activity and symptom questionnaires may be used to estimate a patient's functional

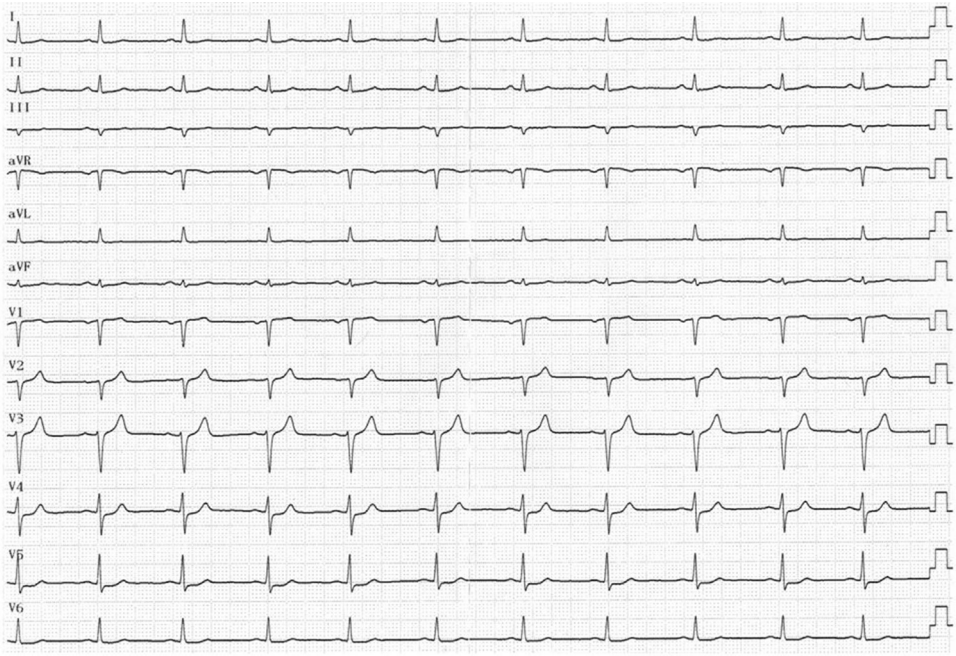

Fig. 3. Electrocardiogram just after percutaneous coronary intervention showed sinus rhythm with no ST segment elevation.

capacity and to individualize an exercise testing protocol in accordance with exercise testing guidelines.

Conflict of interest

Authors declare no conflict of interest.

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