ONOMY Science

American Journal of Cardiology and Cardiovascular Diseases
ISSN 2641-2438

Case report Open Access

Diffuse ST-segment elevation on ECG suggesting multivessel coronary spasm is independent predictor of major cardiac event

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Citation: Diffuse ST-segment elevation on ECG suggesting multivessel coronary spasm is independent predictor of major cardiac event. Am J of Card and Cardiovas Disc.2021; 4(1): 01-04.

Submitted: 24 February 2021; **Approved:** 12 March 2021; **Published:** 16 March 2021

Abstract

A 63-year-old man with history of hypertension and smoking induced the diseases including anterior and inferior myocardial infarction, ventricular fibrillation, and cardiac arrest. Coronary artery angiography (CAG) revealed spasm of the left coronary artery and right coronary artery (RCA), which was relieved by intracoronary injection of nitroglycerin. Our findings suggested multivessel spasm would be associated with a significant increase of the risk of clinical complications.

Key Words: coronary spasm, Acute myocardial infraction, Ventricular Fibrillation

Introduction

Coronary spasm is defined as a condition associated with main large epicardial coronary artery transiently abnormal contraction. While the coronary artery is completely or nearly completely occluded by spasm, the transmural ischemia would occur in the region perfused by the artery. Anginal attacks with ST elevation on the standard ECG would observe at rest without any apparent trigger. This pathological condition is known as variant angina, which is less often used. However, vasospastic angina, which is a clinical entity characterized by episodes of rest angina that promptly respond to short-acting nitrates and are attributable to coronary artery vasospasm.

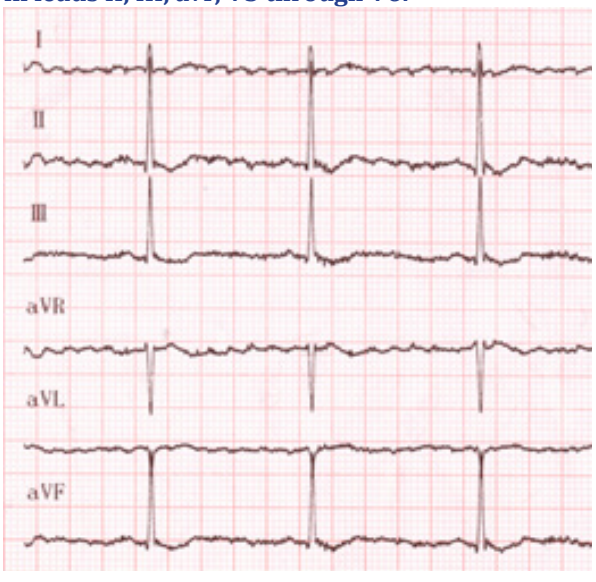
Coronary spasm usually appears at the same coronary artery in the same patient. However, it is not rare that ST segment elevation occurs in the anterior leads during one attack and in the inferior leads in another in the same patients. There are also patients in whom ST segment elevation occurs simultaneously both in the anterior and inferior leads. These are patients with simultaneous multivessel coronary spasm and the attacks often result in sudden death. However, spontaneous and alternate coronary artery spasm (CAS) leading to myocardial infarction (MI) and mallignat arrhythmias has been uncommon reported [1-3]. We reported a patient with multivesssel CAS in setting of acute multisite MI who was treated with defibrillation 46 times.

2. Case report

A 63-year-old man with history of hypertension and smoking, was admitted as an emergency with severe chest pain for 2h accompanied syncope in the heavy snow morning. On admission to the emergency room, he was no discomfort at heart rate of 69 beats/min and blood pressure of 81/50 mmHg. Surface electrocardiography (ECG) on admission showed sinus rhmthymias, II, III, avF, V5-6 ST depression (Figure1). Blood tests obtained immediately at arrival showed cTnT normal (<0.1 ng/ml). blood gas analysis revealed normal serum electrolytes were within normal limits. At 39 min after arrival, he developed VF (Figiure2). Immediately after defibrillation, he was successfully resuscitated, surface ECG revealed

ST-segment elevation in I, avL,V1 through V6.

Figure 1. ECG on admission to ED no chest pain onset revealed the ST depression less than 1 mm (0.1 mv) in leads II, III, avF, V5 through V6.



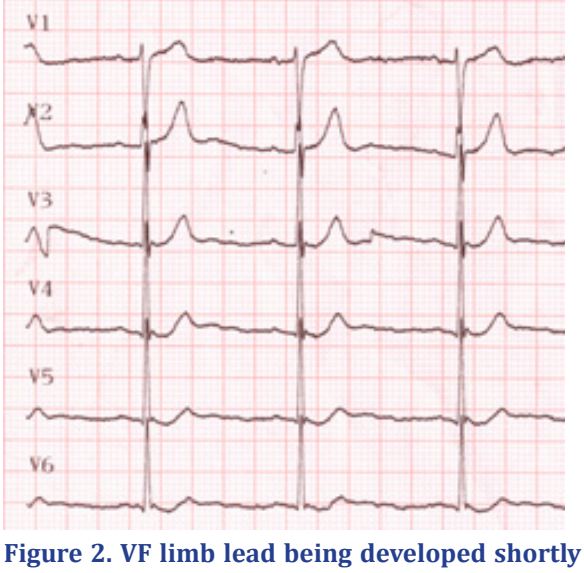
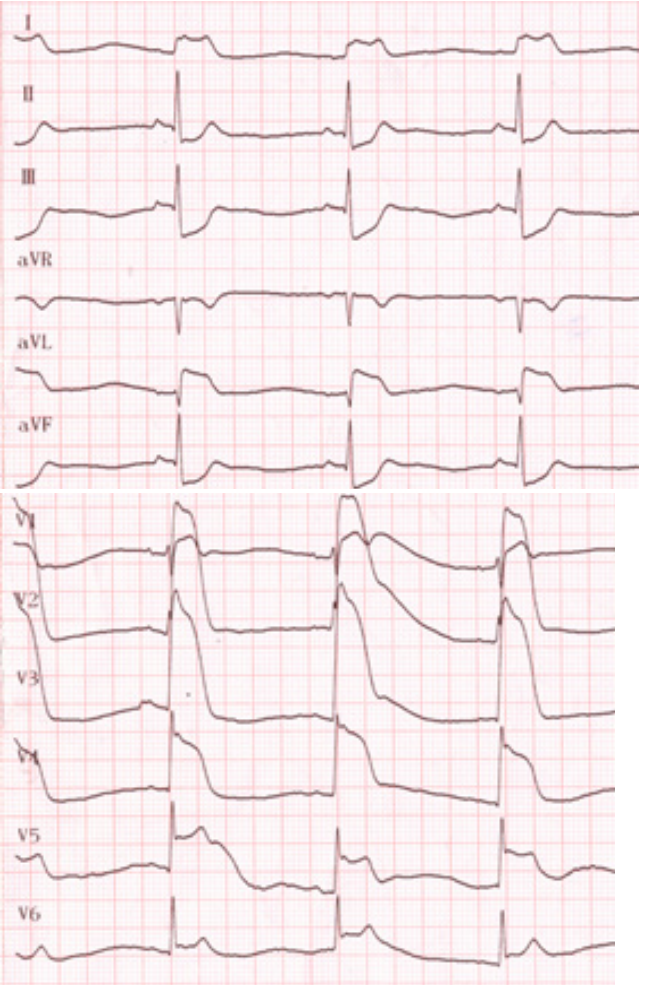


Figure 2. VF limb lead being developed shortly after arrival at the emergency department.

Figure 3. Immediately after DC shock, the surface ECG showed the ST elevated greater than 5 mm (0.5 mv) in I, avL, V1 through V6 and ST depression inferior leads.



He was intubated and put on mechanical ventilation after VF 3 min, he had no conscious again. ECG showed a line (Figure 4), cardiopulmonary resuscitation was started, and adrenaline and atropine were administered, with restoration of cardiac output, ECG revealed sinus bradycardia, ST elevation in the inferior leads II, III, avF leads (Figure 5).

Figure 4. ECG showed a line when he had no conscious again

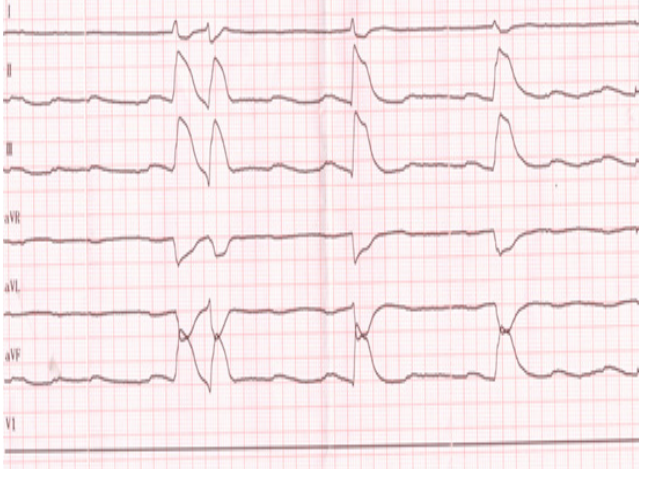


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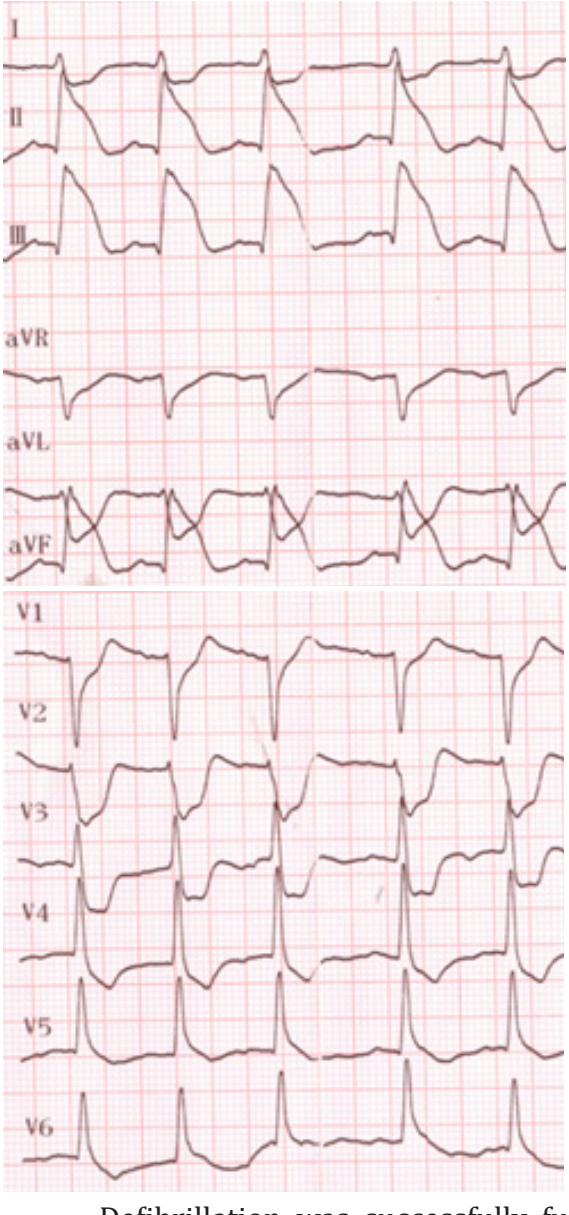
Figure 5 Electrocardiogram taken after cardiopulmonary resuscitation demonstrating sinus bradycardia, ST elevation in the inferior leads.



Defibrillation was successfully fulfilled 40 times before CAG. Meanwhile, amlodipine, lidocaine, eslonal were used to control VF, Dopamine (at the most dosage 20 μg/kg·min) , norepinephrine 60 μg/min were used to increase BP to 90-133/63-112mmHg.

After admission to ED 370 min, emergent coronary angiography was performed via the right femoral artery. CAG showed simultaneous CAS of Left coronary artery system and right coronary artery (Figure 6 AC ,Figure 7E), after intracoronary administration of nitroglycerin, there was normalization of coronary artery diameters (Figure 6 BD, Figure 7 F). VF did not recur. He died 6h after admission to intensive care unit because of cardiac shock, pulmonary edema.

Figure 6. Coronary angiography showed simultaneous spasm of the entire left coronary system.
A AP+CAU oblique projection

B normal after intracoronary injetinof nitroglycerin

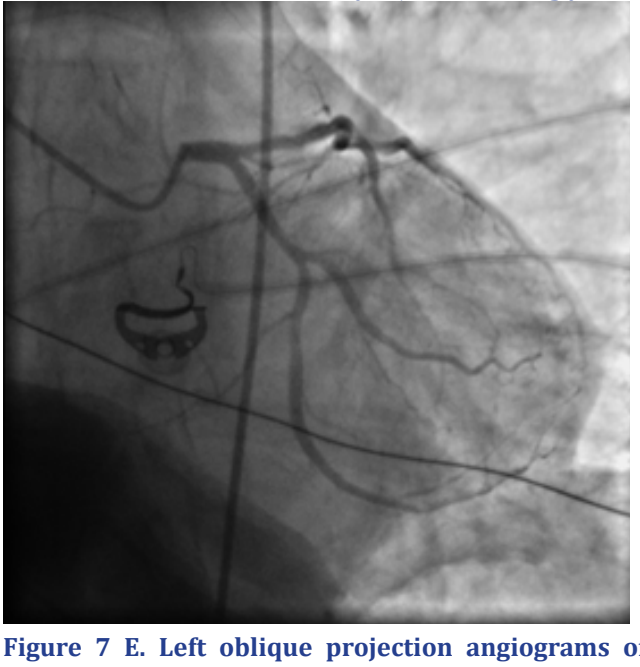


Figure 7 E. Left oblique projection angiograms of right coronary coronary artery showed spasm of proximal of RCA F. normal after intracoronary injection of nitroglycerin

Discussion

In the present case report showed that the spontaneous and alternate coronary artery spasm in the entire coronary artery system caused acute anterior and inferior MI, cardiac shock,VF and cardiac arrest. To the best our knowledge, this case has never previously been reported. In the present case the patient in the ED room treated defibrillation 40 times (6 times defibrillation during CAG), mechanical ventilation, itropic support.

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Our patient had anterior ST elevation during an episode of chest pain implying spasm in LAD. ST elevation in the inferior leads suggesting spasm of the RCA. The anterior ST elevation was associated with VF, electronic storm, and the inferior leads ST elevation with cardiac arrest. At the time angiography, spasm of the triple coronary artery was relieved by intrococonay NTG. Therefore, we infer that the left and right coronary spasm in this patient is alternately occurring. There are a few reports of severe arrthythmias by simultaneous spasm of left and right coronary artery [3]. One coronary spasm induced by another one is relatively rare.

CAS is not rare in clinical, mostly occur in signal coronary artery, single site. Multivessal spasm is relatively rare. It was reported that Japanese patients with multivessel coronary spasm accounted for 8% of the 2251 study population [4] and 5.9% of 202 patients [5]. Our patient had some typical manisfestation, such as: ①The attack occurs at rest, particularly from midnight to early morning; ②The attack is associated with ST segment elevation the ECG. This case was diagnosed consistent with diagnostic criteria [6].The risk of sudden death for patients with coronary vasospastic angina is approximately 2% and is most common in patients with multivessel CVS. Arrhythmia caused by coronary spasm, in addition to the treated of coronary spasm, also targeted measure for different life threatening arrhythmias should be taken. This patient did not take active coronary angiograph and IABP implantation at the early stage of this case.

In conclusion, alternate multivessel CAS may lead to threatening arrhythmias: VF and cardiac arrest in patient without significant coronary stenosis. Such patients need to be aggressively treated with vasodilators. Our case stress the fact that although rare, when occurring, multivessel spasm is associated with a significant increase of the risk of clinical complications and showed therefore require careful attention.

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