



RESEARCH ARTICLE

AN UNCOMMON PRESENTATION OF RIGHT VENTRICULAR ISCHEMIA AND COMPLETE ATRIOVENTRICULAR BLOCK INDUCED BY SEVERE CORONARY SPASM

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ABSTRACT

Coronary spasm is one of the mechanisms of myocardial infarction with non fixed organic stenosis of epicardial coronary arteries. Right ventricular ischemia with High-degree AV block and coronary spasm have been reported together rarely in medical literature. This is a case of a 57-year-old man; Admitted to emergency for chest pain, ECG showed third degree atrioventricular block with ST segment elevation in inferior and right derivations, coronary angiography with methergine test revealed an ostial spasm of the right coronary from, rapidly regressive after an intracoronary injection of isosorbide dinitrate.

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INTRODUCTION

Prinzmetal angina, also known as vasospastic angina, is characterized by episodes of chest pain at rest associated with ECG alterations caused by transient coronary artery spasm. In 25% of cases these alterations are followed by various types of arrhythmia (Ledakowicz-Polak, 2009). Although some of these arrhythmias can be fatal (Filipa Ferreira, 2012). Ventricular arrhythmias are more often associated with ST-segment elevation in the anterior leads, and bradyarrhythmias when located in the inferior leads (Yasue, 2008). In this case report, we review our experience with a patient who had right ventricular ischemia and complete atrioventricular block induced by severe coronary spasm of right coronary artery that was not associated with significant coronary artery narrowing. We place special emphasis on the characteristics and evolution of this uncommon presentation.

Case Report

A 57 year-old man suffering for the first time from chest pain that started one hour ago before his admission to the emergency service. He had as cardiovascular disease risk factors: age, sex and smoking.

His physical examination was normal and electrocardiogram (ECG) indicated ST segment elevations in inferior leads (II, III and aVF), ST segment depression in high lateral leads (I, aVL) with complete AV block "Fig. 1". Disproportionate ST segment elevation with greater ST elevation in lead III than in lead II, It showed also ST segment elevation across the entire right precordium from V1R through V4R "Fig. 2". Primary PCI was not possible within the time frame of 120 min from the first medical contact. Given the persistence of the chest pain and ST elevation with right ventricular ischemia and complete atrioventricular block, it was decided to proceed with thrombolytic therapy. After one hour of thrombolysis, the pain regressed with progressive normalization of the ECG, transthoracic echocardiography made after spasm was within normal limits and Coronary angiography showed angiographically normal coronary arteries. A month later, the man was admitted to our hospital complaining of the same symptomatology, his initial ECG indicated ST segment elevations in inferior leads with complete AV block. After 15 minutes, a repeat ECG showed a spontaneous resolution of ST-segment elevation and atrioventricular block. Coronary angiography with ergonovine test revealed a spasm of the proximal portion of the right coronary artery and its ostium, rapidly regressive after an intracoronary injection of isosorbide dinitrate "Fig 3, 4, 5".

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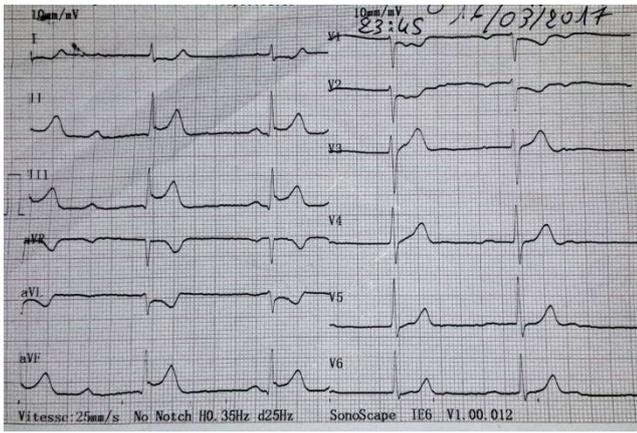


Fig. 1. ECG indicated ST segment elevations in inferior leads (II, III and aVF), ST segment depression in high lateral leads (I, aVL) with complete AV block

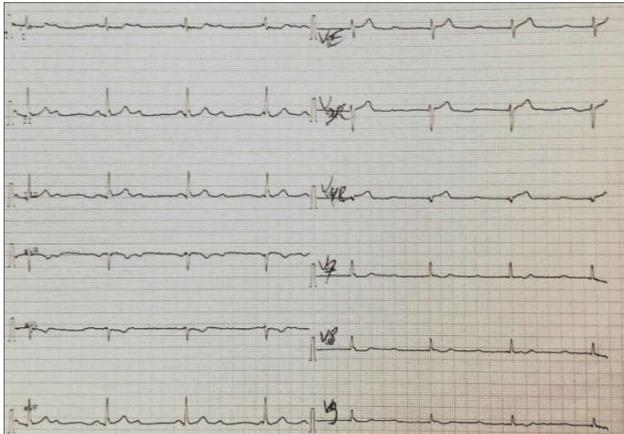


Fig. 2. ECG showed ST segment elevation across the entire right precordium from V1R through V4R



Fig. 3. Baseline coronary angiogram showed spontaneous mild spasm of proximal right coronary artery but without significant stenosis



Fig. 4. Severe spasm of the proximal portion of the right coronary artery and its ostium following intracoronary infusion of ergonovine

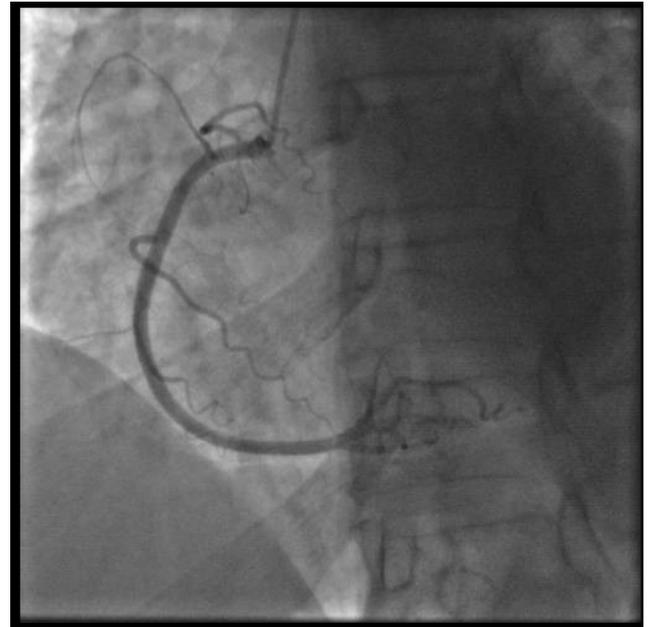


Fig. 5. Spastic right coronary artery was dilated than the baseline coronary angiogram after intracoronary injection of nitroglycerin

DISCUSSION

We define coronary spasm as an abnormal contraction of an epicardial coronary artery resulting in myocardial ischemia (Yasue, 1983). The AS predominantly affects men, women account for only 12 to 25% of cases in the largest published series (Kawana, 2013 and Zhu, 2013). The endothelium, a target of cigarette smoking, plays a key role in vasomotor regulation, and its dysfunction may be the first detectable sign of the early stages of atherosclerosis (Zeicher, 1991). There is strong evidence supporting the role of smoking as a risk factor for coronary spasm (Caralis, 1992). The stress, exposure to cold, Valsalva maneuver, hyperventilation and Magnesium deficiency are also associated with coronary spasm (Hirofumi Yasue, 2008). The modes of disclosure of AS are diverse. In the literature, we often find resting or mixed angina, exceptionally an angina of pure effort, cardiac arrest or

The patient was strongly advised to quit smoking. The progression under calcium channel blockers (CCBs) was favorable, until one month of follow-up, where the patient presented moderate chest pain, occurring at rest, disappeared spontaneously. This required increased doses of CCBs and administration of oral nitrates.

syncope and less rarely an acute coronary syndrome (ACS) like our case, in this situation a spastic angina may be involved in about 10% of a European patient series (Ong, 2008). Total or subtotal occlusion of a major coronary artery by spasm, results in ST segment elevation in the leads that represent the area of myocardium supplied by the artery. Bradyarrhythmias appear more frequently when ST segment elevation occurs in the inferior leads. The high-degrees of bradyarrhythmias are often associated with hypotension, and sometimes with syncope (Hirofumi Yasue, 2008). Right ventricle myocardial infarctions accompany inferior wall ischemia in up to one-half of cases. Because the standard 12-lead electrocardiogram is insufficient for the assessment of right ventricular involvement, right-sided precordial leads should always be included (Tomas Ondrus, 2013). According to the database of the multicenter registry of the Japanese Coronary Spasm Association (1,429 patients), coronary spasm is somewhat more common at right coronary artery than left anterior descending artery; and it affects to a lesser degree, multivessel coronary artery and left circumflex coronary artery (Yusuke Takagi, 2013). In our case, the atrioventricular block is thought to be due to ostial spasm of the right coronary artery. The drugs most often used clinically as provocative agents for coronary artery spasm are Methylethylergometrine (synthetic analogue of ergonovine) and acetylcholine (ACh), Coronary arteries involved in spasm are super-sensitive to These safe pharmacological tests (Ciliberti Giuseppe, 2017). The attack of coronary spasm can usually be promptly relieved by the sublingual administration or oral spray of nitroglycerin or isosorbide dinitrate. In refractory spasm, intravenous or intracoronary injection of the drugs may be necessary. For the prevention of attack, long-acting drugs are needed and CCBs are very effective for this purpose. Long-acting nitrates (oral or transdermal) are also useful for preventing coronary spasm (Hirofumi Yasue, 2008). Stopping smoking is a necessary complementary measure. Beta-blockers, especially if nonselective, can trigger or prolong episodes of coronary artery spasm and should therefore be avoided (Meyrburg, 1992). Randomized prospective studies will be needed to confirm the effect of aspirin on cardiovascular events in coronary vasospastic angina patients without significant coronary atherosclerotic stenosis (Ishii, 2016). In the case presented, the coronary spasm was controlled, and consequently the atrioventricular block. Few cases in the literature have required implantation of a pacemaker or cardioverter defibrillator, although this option should be considered whenever there are arrhythmic episodes that are refractory to optimal medical therapy (Yasue, 2008).

Conclusion

It is sometimes difficult to differentiate between a coronary spasm and acute myocardial infarction, which may lead to unwarranted thrombolytic therapy. Coronary spasm may be so severe that total organic occlusion with fatal complications such as right ventricular ischemia and complete atrioventricular block. In the case presented, the evolution was favorable, There are, however, some patients with coronary spasm whose attacks are refractory to and cannot be completely controlled by medications.

Conflict of interest

The authors report no relationships that could be construed as a conflict of interest.

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