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ST-elevation myocardial infarction in a middle-aged woman due to coronary vasospasm: A case report

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Abstract

A 52-year old woman developed sudden crushing retrosternal chest pain, and an electrocardiogram (ECG) taken in the ambulance revealed ST-segment elevation in the anterolateral leads. Coronary angiography was immediately performed at the Regional University Hospital and showed severe vasospasm of the Left Anterior Descending Artery (LAD) but otherwise normal coronary arteries without any stenosis, and therefore percutaneous coronary intervention (PCI) was not performed in this condition. The troponin I measurements were significantly elevated and bedside echocardiography revealed decreased left ventricular ejection fraction. The patient was diagnosed having a transmural myocardial infarction caused by severe coronary vasospasm. Physicians should be aware of this condition as a possible cause of myocardial infarction, as it requires other pharmacological intervention and has a better prognosis compared to myocardial infarction caused by coronary artery stenosis.

Introduction

Coronary vasospasm is a potential cause of myocardial infarction, and a literature search on PubMed revealed few earlier reported cases of myocardial infarction, where coronary vasospasm was suspected as the cause of the myocardial infarction. Coronary vasospasm may occur in patients with an absolutely normal coronary angiogram, but occurs more frequently in vessels with non-obstructive atheroma[4]. In the following sections we report our case and discuss this condition in more detail.

Case Presentation

A 52-year old non-cigarette smoking woman with a medical history of hypertension and hypercholesterolemia developed sudden crushing retrosternal chest pain. The patient's father had died after suffering acute myocardial infarction in his early forties. An ECG (figure 1) revealed

ST-segment elevation in the anterolateral leads (V2 – V6) and the patient was immediately transported to the Regional University Hospital, where coronary angiography was performed and revealed severe vasospasm of the Left Anterior Descending Artery (LAD) but otherwise normal coronary arteries without any stenosis. Percutaneous coronary intervention (PCI) was therefore not performed.

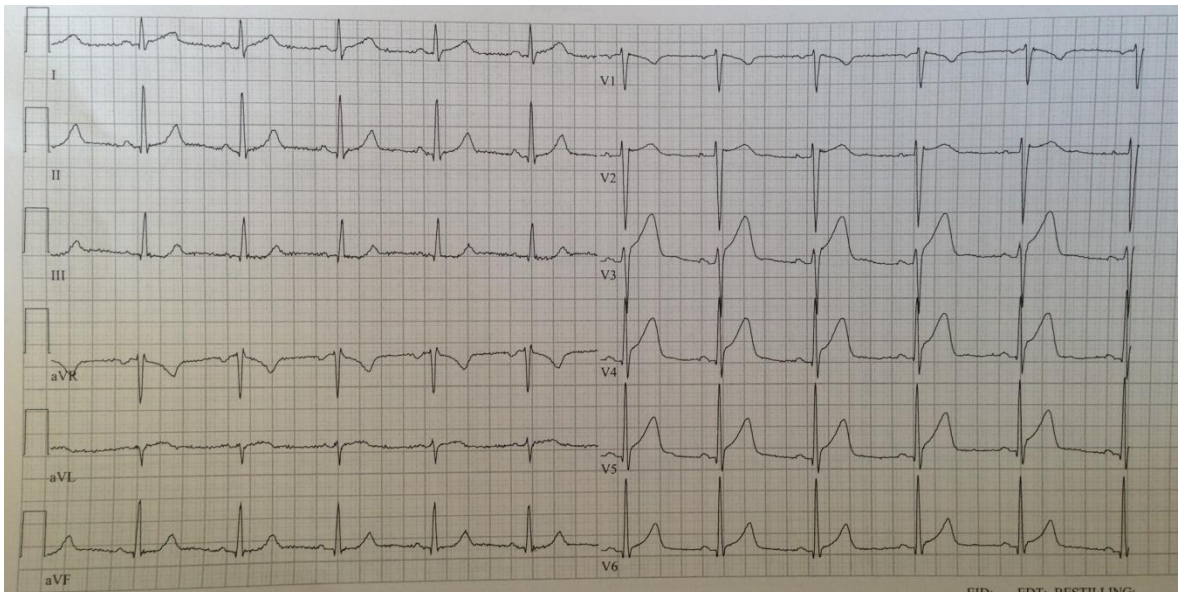

Figure 1: Patients ECG on admission to the hospital revealing ST-segment elevation in the anterolateral leads (V2 – V6).

The pain diminished following intravenous nitroglycerin administration. Troponin I measurements were significantly elevated and the patient was considered having a myocardial infarction caused by coronary vasospasm (Table 1).

Hour(s) following hospitalization	Troponin I value (RI < 25 ng/L)
1	489
12	17000
20	42505

Table 1: Troponin I measurements during hospitalization, revealing significantly increased values due to the myocardial infarction.

Bedside echocardiography revealed decreased left ventricular ejection fraction (45 %) and hypokinesis of the anterolateral wall (supplied by the LAD). The patient was several days later

discharged from hospital in treatment with a long-acting nitrate and a Calcium-channel blocker. On follow-up three months later, the patient had not experienced any cardiac related symptoms.

Discussion

Coronary vasospasm is a potential cause of myocardial infarction, and there are few earlier case reports describing this topic. In our case report a 52-year old woman developed ST-elevation myocardial infarction due to severe coronary vasospasm.

It is very important to be aware of this rare but important cause of myocardial infarction, as patients with coronary vasospasm are differently treated compared to patients with coronary artery stenosis as the cause of the myocardial infarction. It is documented, that patients with myocardial infarction due to coronary vasospasm are effectively treated with calcium antagonists and long-acting nitrate[2,5]. Beside myocardial infarction, coronary vasospasm may also cause various other cardiac disorders such as unstable angina pectoris, syncope, serious arrhythmia and heart failure[5].

Several conditions and risk factors may trigger coronary vasospasm such as hypovolemia, smoking, thyroid dysfunction, recreational drug use (cocaine, ethanol, amphetamine), excessive emotional stress, some antibiotic medications and collagen disorders[1,2].

Hadi et al.[1] reported a case of a 78-year old cigarette smoking male with a medical history of hypertension, who suffered ST-elevation myocardial infarction due to coronary vasospasm. The suspected trigger of the coronary vasospasm in this patient was believed to be hypovolemia.

Gosai et al.[4] reported a case of a 62-year old woman, who developed transmural myocardial infarction due to coronary vasospasm. The patient was successfully treated with intracoronary nitrate injection. This patient had a medical history of treated hypothyroidism and was obese.

However, the patient in our case did not have any of the above mentioned suspected triggers of coronary vasospasm.

It is important to notice that the prevalence of coronary vasospasm is higher in Japanese and Korean populations than in the Western population. A combination of genetic and environmental factors is believed to be the possible explanation for this difference[4,5].

It is possible to perform spasm provocation tests, such as intracoronary injection of acetylcholine or intravenous ergonovine administration, to induce coronary vasospasm in suspected patients[5,6,7].

These tests can assist the physician in diagnosing this condition in patients with myocardial infarction and normal coronary arteries. However, spasm provocation tests are rarely performed in the USA and Europe, while they are widely performed in Japan[5].

It could be interesting to perform spasm provocation tests routinely in Europe in patients with myocardial infarction and normal coronary arteries to help diagnosing this condition accurately, as patients suffering coronary vasospasm related myocardial infarction would have more benefits when treated with long-acting nitrate and calcium antagonists. Another important point is that

patients with myocardial infarction and normal coronary arteries are shown to have a better long term prognosis than those with coronary artery stenosis. The only two independent predictive factors of poor outcome in patients with myocardial infarction and normal coronary arteries are left ventricular function and diabetes as documented in a study performed by Da Costa et al.[8].

Conclusion

We report a case of a 52-year old woman, who developed ST-elevation myocardial infarction due to severe coronary vasospasm. The patient was successfully treated with coronary antispasmodic and vasodilator drugs.

The key message of our case report is that coronary vasospasm must be suspected as a potential cause of myocardial infarction in patients with normal coronary arteries, as the treatment and prognosis of these patients differ compared to those with coronary artery stenosis.

It could be important to consider the routinely use of spasm provocation tests in suspected patients, as these tests could effectively help in the correct diagnosis of this condition.

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Conflict of interests

The author declares that there is no conflict of interests regarding the publication of this article.

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