CLINICAL VIGNETTE

Coronary Vasospasm in a Young Adult Woman

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Case Report

A 24 year old female presented to the emergency department with 2 hours of crushing substernal chest pain. She had a history of multiple previous episodes similar chest pain over the past two years. On the initial presentation, she was found to have a Troponin elevation of 5.1 nanograms per millilitre (ng/ml). At that time coronary angiography was performed and demonstrated normal anatomy, without atherosclerotic disease. Over the course of two years, the patient experienced occasional recurrent episodes of similar chest pain, despite compliance with long acting nitrates, calcium channel blockade and beta/alpha-1 blockade. She had a comprehensive workup for hypercoagulable syndromes, autoimmune markers, as well as a repeat angiogram that was again normal. Her cardiac stress testing had been unremarkable. Echocardiography was unremarkable. The patient's lipid profiles had been in an ideal range. She was a non-smoker. There was no early family history of coronary artery disease.

At the time of this recent presentation, the patient reported she had been at rest. Her normal level of activity included lap swimming for 30-minute durations. She reported no chest pain with exertion. She had a history of depression and had been maintained on her current selective serotonin reuptake inhibitor (SSRI) antidepressant regimen for the past year. She denied active depressive symptoms. She had no history of migraine headaches, nor was she using medications to combat migraines. At the onset of her current symptoms, she attempted to reduce pain with sub-lingual nitroglycerine. In the emergency room, the patient was given an additional two doses of nitroglycerine but still maintained a level of chest pain. In the past she reported that morphine sulfate alleviated her symptoms; however the Emergency physician was concerned about drug seeking behavior and therefore refused treatment with opiates. Gradually the patient's pain subsided. Drug toxicology screening was negative. While her initial Troponin was less than 0.04 ng/ml, a follow-up at 6 hours had elevated to 1.0 ng ml. Subsequent follow-up troponin levels decreased, and the patient was discharged on her current medical regimen.

Discussion:

Based upon the patient's previous evaluation it was presumed that she suffered from another episode of coronary vasospasm; such cases of chest pain due to myocardial ischemia in patients with normal stress testing was first described by Prinzmetal et.al. in 1959.[1] In a younger patient with no cardiovascular risk factors, toxicologic contributors that may facilitate vasospasm must be considered. While Cocaine's effects on the coronary vasculature may be multifactorial, and its prothrombotic effects have been described, it has potent vasoconstrictor effects.[2,3] Ergotamine use in migraine treatment has been well described as a potent vasoconstrictor and culprit in coronary vasospasm.[4,5] Tryptans used in acute migraines have also been associated with acute coronary vasospasm.[6,7] Amphetamines both prescribed and illicit, have been associated with coronary vasospasm.[8] Coronary vasospasm is an associated complication of the Serotonin Syndrome[9], however no case reports of acute vasospasm from SSRI therapy in the absence of this syndrome could be found.

Coronary vasospasm has been delineated into two groups, based on the presence or absence of atheromatous coronary pathology. Those with pathology on angiography are characterized as typical angina pectoris. The subgroup without definable disease are referred to as having variant angina.[10] Hemodynamic studies have delineated further differences between typical angina pectoris and variant angina. While typical angina pectoris can be elicited by increases in myocardial oxygen demand that go beyond myocardial oxygen supply, this is not the case in variant angina. In variant angina, instead of myocardial oxygen demand increasing, consumption decreases. The sudden coronary vasospasm limits supply and resultant transmural ischemia.[11] Typically, patients with variant angina will not therefore have exertional symptoms.

The incidence of variant angina has been estimated to compose 2-3% of patients undergoing coronary angiography.[12] The 5 year survival rate is 89-97%.[13] A number of medical interventions have been used for treatment of variant angina, with unique differences from typical angina pectoris. Both forms will respond rapidly to sublingual and intravenous nitrates. While beta blockade is a preferred therapy in angina pectoris, there are more theoretical concerns over the use of beta adrenergic blockers with variant angina. Beta blockade leave unopposed alpha receptor mediated vasoconstriction in some patients with variant angina.[14] Beta adrenergic stimulation also facilitates coronary vasodilatation and so in variant anginal patients, this is beneficial.[5] The inhibition of contraction of smooth muscle cells through calcium uptake inhibition, can prevent coronay vasospasm.[15] Nifedipine, a dihydropyridine based calcium channel blocker, and verapamil, a non-dihydropyridine based calcium channel blocker both are used to reduce the incidence of variant angina.[16,17] Combinations of nitrates with either nifedipine or verapamil are thought to be additive in their vasodilatory effects.[18]

In the case presented above, the patient met criteria for variant angina. Attempts at reducing incidence of attacks with long acting nitrates, and calcium channel blockers may have reduced the frequency of her attacks. It is unclear if she benefited from the utilization of beta blockade, based on the mechanism of variant angina in contrast to angina pectoris. The patient reported on multiple episodes previously, she obtained more immediate relief from morphine sulfate. There is no data supporting use of morphine directly for treatment of variant angina. Morphine is thought to assist in preload reduction and to a lesser extent systemic vascular resistance, as well as result in heart rate reduction, however these results remain controversial.[19,20] The resultant effects may lead to overall reduction in the patient's oxygen demand.[21] Morphine may, through release of histamines, facilitate nitric oxide release and thus result in arterial vasodilation.[22] However, retrospective studies have correlated an increase risk of death in patients with acute coronary syndromes who were treated with morphine.[23] After attempts had been made to reduce this patient's symptoms with nitrates, and calcium channel blockade, theoretical additional benefit from morphine, may have only been analgesic, or may have contributed to the relief of coronary vasospasm, but this mechanism remains poorly defined. Additional studies into further pharmacotherapy for variant angina are appropriate.

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