

CLINICAL VIGNETTE

Atypical Chest Pain

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Case Report

A 39-year-old male with hyperlipidemia awoke with new onset of shortness of breath and chest pain. Paramedics were called, and he was given nitroglycerin with some relief before being transported to the emergency room. EKG revealed ST segment elevation in lead II with ST and T wave changes. He was given additional nitroglycerin with partial relief. No heparin was given. Initial troponins were negative. He was taken directly to the catheterization lab for a left heart catheterization which revealed no abnormalities of coronary arteries. At catheterization, there were no elevated ST segment. There was no evidence of coronary artery spasm, no coronary ultrasound was done. A provocative study was not done. He was given diltiazem and aspirin and admitted overnight. No changes in his EKG were noted. The patient was discharged for cardiac rehabilitation and scheduled for follow-up evaluation of hyperlipidemia.

He continued to have 2-3 episodes of chest pain, and his diltiazem was increased to 180 mg. Nitroglycerin spray provided partial relief. Six months later, he again presented to the emergency room with morning chest pain with ST segment elevations and no enzyme changes. He was admitted overnight and discharged on long-acting nitrates in addition to his previous regimen. He was seen at another hospital for evaluation. The team concurred with the diagnosis of Prinzmetal's angina.

Discussion

In 1959, Prinzmetal and associates described 32 patients with a syndrome of recurrent rest angina associated with ST segment elevation.¹ This myocardial ischemia occurs almost exclusively at rest and is not usually precipitated by physical exertion or emotional stress. Two characteristic findings were non-exertional chest pain and ST segment elevation, rather than ST segment depression, such as noted in the exercise-induced angina. There is a circadian variation of the attack usually occurring from midnight to 8 a.m. or its comparable time of which 52% of the attacks have been noted. In fact, in early a.m., even mild exercise can induce an attack, where as in the afternoon vigorous exercise does not produce an attack.

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Symptoms that occur aside from chest pain are light-headedness, syncope, or palpitations due to ischemia-related ventricular dysfunction or related dysrhythmias.

The original hypothesis of Prinzmetal was that vaso-spasm causes a transient abrupt marked decrease in diameter of an epicardial or larger septal coronary artery that results in myocardial ischemia. The decrease in diameter can usually be reversed by nitroglycerin, sometimes requiring large doses. The vaso-spastic segment appears to occur in sites with minimal atherosclerotic deposits. Patients with Prinzmetal angina may have increased basal coronary artery tone. In other patients, the site of spasm may be adjacent to atherosclerotic plaques. Various etiologies have been proposed, which include endothelial injury and hypercontractility of vascular smooth muscle as a result of mutagens, leucotrienes, serotonin, endothelin, angiotension II, and histamines.² The major provocative test is ergonovine maleate, an ergot alkaloid, which stimulate both alpha adrenergic and serotonergic receptors producing a direct constrictive affect on vascular smooth muscle, resulting in chest pain and ST segment elevations in patients with variant angina. Occasionally, this may produce the same response in effort-related angina. The majority of patients who have a response to ergonovine respond to a dose of less than 0.2 mg. However, prolonged coronary artery spasm precipitated by ergonovine may produce myocardial infarction or conduction disturbance. Due to the risks, a provocative ergonovine test should only be considered in patients who have had an echocardiogram or who have very normal coronary arteries by angiography. Women seem to be more sensitive to ergonovine testing.³

Yasue et al compared a beta-blocker, a calcium channel antagonist, and an alpha-blocking agent.⁴ They reported the beta-blocker which normally reduces myocardial oxygen demand did not suppress the pain and in fact it aggravated the attack in about 50% of the patients. However, the calcium antagonists and the alpha-blocking agent suppressed the attack in most of the patients. These findings indicated that the attack is caused by coronary spasm and not increasing myocardial oxygen demand. The mainstay therapies, therefore, are calcium channel blockers with or without long-acting nitrates. In Prinzmetal angina, nitrates abolish or prevent myocardial ischemia by exerting a direct vasodilatory effect on the spastic coronary artery. Calcium channel blockers inhibit the entry of calcium ions into the smooth muscle cells producing a smooth muscle cell relaxation.

Apparently, all first generation calcium channel blockers have similar effects. The second generation calcium channel blockers also have similar effects. These drugs may be adjusted based on symptom control and side effects, such as hypotension. Prazosin, an alpha-adrenergic agent, is also helpful. Aspirin may exacerbate symptoms by inhibiting the biosynthesis of the vasodilator, prostacycline.⁴ However, this has not been demonstrated clinically.

Prognosis

Recurrent anginal symptoms are common during the first six months after diagnosis. Despite this, 89%-97% of patients survive.⁵ Bory et al followed 277 patients with coronary artery spasm for up to 7.5 years found that 39% had recurring angina symptoms, and 34% were asymptomatic. Cardiac death occurred in 3.5%, and MI's occurred in 6.5%.⁶ Patients with variant angina who have had serious arrhythmias (ventricular tachycardia, fibrillation, and asystole) have an increase risk of sudden death.

Conventional angiography has significant limitations. The question remains to improve diagnosis in patients with normal angiography. Forty percent of the subendothelial space must be involved before the atherosclerotic lesion impinges on the lumen - angiography can only detect lesions with more than 10% impingement of the lesion into the lumen. Could intracoronary ultrasound or some other technique to evaluate plaque development, not necessarily in the lumen of the artery but along the lumen wall, improve diagnosis and understanding of the disease? These are projects for now and the future.

REFERENCES

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