

# Prinzmetal's variant angina associated with severe heart rhythm disturbances and syncope: A therapeutic dilemma

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## Abstract

*Prinzmetal's angina is a distinct syndrome characterized by episodes of chest pain and transient ST-segment elevation caused by coronary vasospasm. This variant form of angina is sometimes associated with complete atrioventricular block and ventricular arrhythmias. We report here a case of variant angina with documented severe heart rhythm disturbances and syncope in a 66 year-old woman. Due to recurrent episodes of high-degree atrioventricular block, a DDD pacemaker was implanted. No further symptoms of angina or cardiac arrhythmias were detected on optimal therapy. (Cardiol J 2009; 16, 3: 269–272)*

**Key words:** Prinzmetal variant angina, arrhythmias, treatment

## Introduction

The first description of a special, variant form of angina was presented by Myron Prinzmetal in his classic publication in 1959 [1]. Variant angina by definition is a distinct clinical presentation characterized by episodes of chest pain occurring at rest, especially in the early morning, associated with ST-segment elevation rather than depression, and caused by coronary vasospasm. The natural history of variant angina is not fully understood. Patients with variant angina are younger, mostly female and usually do not have traditional cardiovascular risk factors (other than cigarette smoking) [2, 3]. The episodes are short in duration but in some cases vasospasm-induced ischemia causes life-threatening ventricular arrhythmias, transient high degree atrioventricular (AV) block, syncope, and even sudden cardiac death [2–4]. Prolonged transmural ischemia may cause an acute myocardial infarction.

A lot of factors may contribute to the pathogenesis of variant angina. Endothelial dysfunction,

smooth muscle calcium hypersensitivity and increased autonomic tone, oxidative stress and genetic disorders are mainly postulated [4].

Patients with variant angina without coronary artery disease (CAD) have a good prognosis [3].

## Case report

A 66 year-old woman with a history of recurrent chest pain and syncope was admitted to the emergency unit after syncope with preceding retrosternal pain. On careful questioning, she admitted to having had similar attacks during the previous 11 months, which occurred in resting conditions without any apparent trigger and lasted 10–20 minutes.

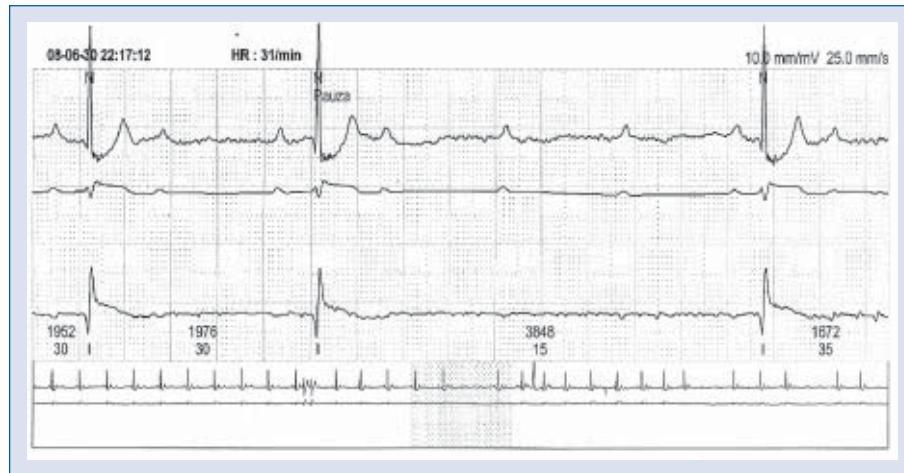
She had no previous cardiovascular disease and no risk factors of CAD. The results of physical examination were within normal limits. The patient was of normal weight (65 kg) and 1 m 65 cm tall. Arterial blood pressure was 110/80 mm Hg. Complete blood tests and cardiac biomarkers disclosed normal findings. The resting electrocardiography

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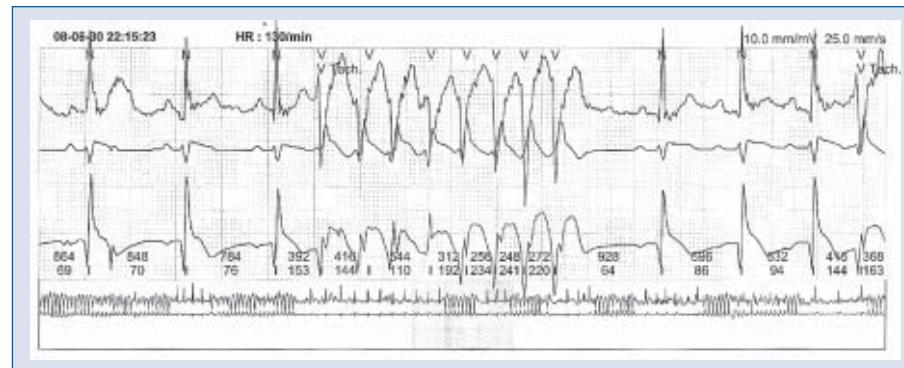
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**Figure 1.** Third-degree atrioventricular block during chest pain recorded in the 24-hour Holter ECG.



**Figure 2.** Continuous 24-hour ECG Holter monitoring revealed non-sustained ventricular tachycardia associated with attack of angina.

(ECG) recorded on admission was correct. The 24 hour ECG Holter monitoring revealed acute ST-segment elevation (in the leads II, III, and aVF) with following transient third degree AV block with slow ventricular rhythm 35 bpm (Fig. 1). These symptoms occurred during the night and were accompanied by typical chest pain. Additionally, between AV block events and 57 pauses over 2.5 s (max 6.7 s), non-sustained ventricular tachycardia (nsVT) appeared (Fig. 2). Coronary angiography showed only a non-significant stenosis (< 50%) in the ostial part of the right coronary artery. During angiography a catheter provoked severe spasm of right coronary artery as well as typical ST-segment elevation (Fig. 3). A cardiac ultrasound examination showed normal heart measurements and function.

A treatment of nitrates (isosorbide mononitrate 100 mg/d.), diltiazem 240 mg/d., and amlodipine 10 mg/d. was administered. Despite such medication,

severe episodes of retrosternal pain and temporary bradycardias occurred. After three days of hospitalization, recurrent episodes of high-degree AV block led to a DDD pacemaker being implanted. No more symptoms of angina or cardiac arrhythmias were detected on optimal pharmacological treatment. The patient was discharged from the hospital in good condition.

She remained asymptomatic for the next three months on optimized medical therapy regimen (acetylesalicylic acid 75 mg/d., diltiazem 240 mg/d., isosorbide mononitrate 50 mg, simvastatin 40 mg/d.). Twenty-four-hour ECG Holter monitoring at three months follow-up has not revealed any serious heart rhythm and conduction disturbances.

## Discussion

Prinzmetal's variant angina is characterized by spontaneous episodes of angina due to coronary



**Figure 3.** Angiography (RAO 30) showed prolonged vasospasm in the proximal part of right coronary artery after contrast injection.

vasospasm leading to myocardial ischemia. Patients with variant angina tend to be younger and symptoms often occur at rest. Most patients with variant angina may have an abnormality of vasomotor tone, and also present symptoms of migraine headache and Raynaud's phenomenon. Typical triggers of coronary vasoconstriction are: alcohol, iced drinks, nicotine, cocaine, acetylcholine, ergonovine, hyperventilation and atrial pacing [2–5].

Patients with variant angina present typical chest pain in association with transient ST-segment elevation in ECG. The angina resolves spontaneously or after nitroglycerin administration.

In some cases during the attack of chest pain, dangerous complications are observed. These include myocardial infarction, arrhythmias and even sudden cardiac death [6].

Continuous 24-hour ECG Holter monitoring in patients with variant angina reveals serious cardiac arrhythmias in approximately 50–60% of cases. During angina episodes both tachyarrhythmias (ventricular tachycardia or ventricular fibrillation) and bradyarrhythmias (asystole, second-, third-degree AV block) may occur. There is no relationship between the severity of CAD and the occurrence of these arrhythmias. The type of arrhythmia depends on the vessel involved. Bradyarrhythmias are associated with acute ST-segment elevation in the inferior leads. In these cases right coronary artery

spasm is mostly observed, whereas ventricular arrhythmias may be connected with acute ST-segment elevation in the anterior leads as a consequence of left anterior descending artery vasospasm [2].

To confirm the diagnosis, additional tests are necessary. The most important tool in documenting the vasospastic origin of symptoms is coronary angiography. 24-hour ECG Holter monitoring can be very useful in the diagnosis of ischemia-induced arrhythmias, but it depends on attacks occurring during recordings. More useful would be an implantable event recorder with a function of ECG data storing [7].

We present a patient with variant angina with typical chest pain, which occurred at rest followed by recurrent syncope a few minutes after the attack onset. The vasospastic origin of symptoms was confirmed by coronary angiography. The 24-hour ECG Holter monitoring recorded during attacks revealed a high degree of AV block with long pauses (max 6.7 s) and nsVT.

The mainstay therapy for variant angina is nitrates and calcium channel blockers. Such treatment prevents vasoconstriction without direct antiarrhythmic effect. The use of beta-blockers, especially non-selective, can promote attacks or prolong vasospastic state [8]. Some studies report the important role of endothelium in the pathomechanism of variant angina [9]. Endothelium produces strong vasoconstrictors and vasodilators regulating the vascular tone (e.g. nitric oxide, endothelin-1, prostacyclin). Acetylsalicylic acid in small doses blocks strong vasoconstrictor-thromboxan A and accelerates the vasodilating and antiplatelet effect of prostacyclin [10].

Our patient also received optimal medical therapy of acethulosalicylic acid, diltiazem and isosorbide mononitrate.

Recently published papers have postulated the beneficial effect of statins on endothelial function, especially in patients with risk factors of atherosclerosis. Adapting the concept of possible coronary spasm due to endothelial dysfunction, we also administered the treatment with simvastatin in our patient.

To avoid syncope during AV block episodes, a pacemaker should be implanted. In cases of recurrent life-threatening ventricular arrhythmias, implantation of automatic cardioverter defibrillator (ICD) is a treatment of choice [11].

For our patient, pharmacological treatment seemed non-effective (recurrent chest pain and bradyarrhythmias), so a DDD mode pacemaker was implanted.

The indication for ICD implantation in a patient with Prinzmetal angina is still not clearly established. The ICD therapy should be implemented in all patients after cardiac arrest with documented ventricular fibrillation or sustained ventricular tachycardia. Primary prevention with use of ICD in patients with nsVT during chest pain is controversial. Effective pharmacological therapy reduces not only the number of chest pain episodes but also the events of serious ventricular arrhythmias. In patients with documented nsVT and a history of unexplained syncope, ICD implantation should be considered despite proper pharmacological therapy and/or pacing.

In our patient's case, pharmacological therapy and pacemaker implantation resolved all symptoms. In the 24-hour ECG Holter monitoring recorded three months after discharge, a proper pacemaker function without ventricular arrhythmias was confirmed.

## Conclusions

In some patients with variant angina and co-existing cardiac arrhythmias the effective and safe treatment remains a therapeutic dilemma, thus necessitating a complex approach. In cases of insufficient pharmacological therapy the implantation of antiarrhythmic devices is necessary.

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