Case Report

JBMEDE
JORNAL BRASILEIRO de MEDICINA DE EMERGÊNCIA

Prinzmetal angina: a case report

Angina de Prinzmetal: um relato de caso

Adriana Figueiredo Flato[1], Beatrys Juliani Ramalho[1], Alana Hordane Migliaccio[1], Amanda Soares do Amaral[1], Ana Beatriz Santos Martins[1], Ana Paula Hara[1], Débora Audi[1], Filipe De Souza Moraes Zamariolli[1], Gabriela Zequini[1], Ila Saes Publio[1], Lucas Ramos Maran[1], Monike Alves Lemes[1], Vitor Machado Benincá[2], Uri Adrian Prync Flato[1]

[1] Universidade de Marília, Marília, SP, Brasil.
[2] Universidade do Extremo Sul Catarinense, Criciúma, SC, Brasil.

ABSTRACT

Prinzmetal angina occurs due to a focal spasm of an epicardial coronary artery, causing severe myocardial ischemia. Smooth muscle contractility disorders may be related to a cause of the disease, however, this is not yet well defined in the literature. The prognosis might be benign, and this case report is an important means for disseminating knowledge about decision-making and describing the diagnostic process and therapeutic approaches. Despite being a rare type of angina, it has considerable challenges, which, if left untreated, can produce severe consequences in the patient's life. It was possible to observe that chest pain related to causes worsening in the patient's quality of life and the possibility of causing myocardial infarction, arrhythmia even sudden death.

Keywords: Case reports; Diagnosis; Therapeutic approaches; Prognosis

RESUMO

A angina de Prinzmetal ocorre devido a um espasmo focal de uma artéria coronária epicárdica, causando isquemia miocárdica grave. Distúrbios de contratilidade do músculo liso podem estar relacionados àcausa da doença, entretanto isso ainda não está bem definido na literatura. O prognóstico pode ser benigno, e o relato deste caso é um importante meio para a difusão de conhecimentos a respeito do tema angina de Prinzmetal, descrevendo o processo diagnóstico e as condutas terapêuticas. A angina de Prinzmetal, apesar de ser uma variante rara de angina, possui gravidade considerável que, se não tratada, gera consequências severas na vida do paciente. Ela provoca piora na qualidade de vida do paciente, devido à dor e pela possibilidade de causar infarto miocárdio, arritmia e até mesmo morte súbita.

Descritores: Relatos de caso; Diagnóstico; Condutas terapêuticas; Prognóstico

INTRODUCTION

Prinzmetal angina occurs due to a focal spasm of a coronary artery, located in the epicardial region, and may cause severe ischemia in the myocardium. Coronary artery vasospasm is an exacerbated and nonspecific but reversible response of the

Adriana Figueiredo Flato: https://orcid.org/0000-0002-5967-3256 • Beatrys Juliani Ramalho: https://orcid.org/0000-0002-1435-8623 • Alana Hordane Migliaccio: https://orcid.org/0000-0001-8547-6590 • Amanda Soares Do Amaral: https://orcid.org/0000-0002-3229-8978 • Ana Beatriz Santos Martins: https://orcid.org/0000-0002-6755-7220 • Ana Paula Hara: https://orcid.org/0000-0003-0670-0895 • Débora Audi: https://orcid.org/0000-0001-9232-4202 • Filipe De Souza Moraes Zamariolli: https://orcid.org/0000-0001-6106-3628 • Gabriela Zequini: https://orcid.org/0000-0002-5687-9662 • Ila Saes Publio: https://orcid.org/0000-0002-8137-0833 • Lucas Ramos Maran: https://orcid.org/0000-0002-5068-4688 • Monike Alves Lemes: https://orcid.org/0000-0002-8769-0993 • Vitor Machado Benincá: https://orcid.org/0000-0002-6487-1433 • Uri Adrian Prync Flato https://orcid.org/0000-0002-8381-8830

Received on: 3/6/2022
Accepted on: 26/1/2023

Autor correspondente:
Uri Adrian Prync Flato
E-mail:uriflato@gmail.com

Source of financing: none.

Conflicts of interest: the authors declare there are no conflicts of interest.

How to cite this article:

Flato AF, Ramalho BJ, Migliaccio AH, Amaral AS, Martins AB, Hara AP, et al. Prinzmetal angina: a case report. JBMEDE. 2022;2(4):e22023.

DOI: 10.54143/jbmede.v2i4.71

contractility of the smooth coronary artery muscle in response to various stimuli. Spasm is believed to occur in arteries without stenosis, but most cases, referring to this form of angina, are related to the presence of spasms as a result of atheromatous plaques. Among the symptoms of PA, typical chest pain located in the retrosternal region, usually at rest, can be mentioned. Alcohol, psychological stress, hyperventilation, exposure to cold, psychostimulants, such as cocaine are triggering factors of the disease, and the main trigger is smoking.[1-3]

The exact cause of the disease is not well defined, however, it may be related to smooth muscle contractility disorders due to vasoconstrictors cytokines, leukotriene, or serotonin. The gold standard diagnosis is the provocative test, in which intravenous injection of vasoconstrictive substances causing coronary spasms such as acetylcholine, methylergonovine, or ergonovine-induced chest pain. Generally, an exercise test is performed to compare the parameters of the patient at rest and to physical stress. In this diagnostic test, analysis of the ST segment of electrocardiogram during an episode of chest pain (which, in normal situations can be at rest nd usually in the morning), occurs as a reaction to the provocative substances. The main forms of treatment for patients with PA are the use of nitrates and calcium channel blockers. Thus, to quickly cease an episode of angina, sublingual or intravenous nitroglycerin is used, while long-action nitrates are used to decrease the number of anginal episodes.[4-7]

The prognosis of this form of angina may be relatively benign, provided that patients are on vasodilator therapy and avoid smoking and alcohol intake. However, PA crises may require hospitalization for more delicate care, and many complications can be fatal, such as acute myocardial infarction, ventricular arrhythmias, and sudden death. Despite the clinical importance of PA, the incidence of this disease is little known, knowing only that it is substantially less common than typical angina, whose cause is related to atherosclerotic coronary stenosis. Refractory chest pain may include a surgical or percutaneous approach. Advanced age, low medication ideation, diabetes mellitus, hypertension, and low family income are risk factors for complications in patients with PA.[1,8-10]

Therefore, given the importance of this theme, the present study aims to describe the diagnostic process and therapeutic approaches of a case of PA. The study was approved by the Ethics Committee of the University of Marília (CAAE: 58928621.5.0000.5491).

CASE REPORT

A 55-year-old brown male patient presented to a specialty outpatient clinic due to typical chest pain for 15 months. He reported chest pain in the retrosternal region, exercise induced for at least 30m, with intensity 10/10 and duration of 5 to 10 minutes, associated with fatigue, sweating, paresis in the right upper limb, and the sensation of cervical stiffening, with spontaneous improvement at rest.

The pain was associated with small daily efforts, such as brushing teeth, squatting, bathing, and evacuating. At the time, he sought care in a Basic Health Unit that guided treatment for reflux.

In the persistence of symptoms, after 3 months of treatment, he underwent a private consultation with a cardiologist and underwent catheterization, which identified a coronary spasm located in middle portion of the anterior descendent coronary artery. Beta-blockers (metoprolol), nitroglycerin, and calcium channel blocker (Diltiazem®) were prescribed.

Inniatily reported significant improvement related chest pain during the firsts 3 months following catheterization, but when performing intense physical exertion, in the 6 month of evolution, pain episodes became frequent again, limiting their work activity and occurring mainly after physical or emotional stress. Comorbidities included systemic arterial hypertension, sedentarism, history of past smoker and no history of cardiovascular or cerebrovascular disease.

On physical examination, the patient was in good general condition, with a blood pressure of 140x100mmHg, saturation at 98%, heart rate of 54bpm, and respiratory rate of 20bpm. Flat and healthy chest. Symmetrical expandability, painless palpation and symmetrical bilaterally, clear pulmonary sound to percussion, vesicular murmurs physiologically distributed to auscultation. Pulses present, full and symmetrical (radial, popliteal, tibial, and pedisal).

Based on these factors, the diagnostic hypothesis was Angina Prinzmetal. However, for diagnostic confirmation, complementary tests were performed. Thus, the patient was advised to maintain drug therapy and perform the following tests: exercise test (**Figures 1 and 2**), myocardial scintigraphy (MS) (**Figure 3**), and coronary angiography (**Figure 4**).

MS showed moderate perfusion abnormalities (10 to 15% of left ventricular mass) in the anterior wall and apex of the left ventricle, indicating moderate ischemia in these regions (**Figures 4 and 5**).

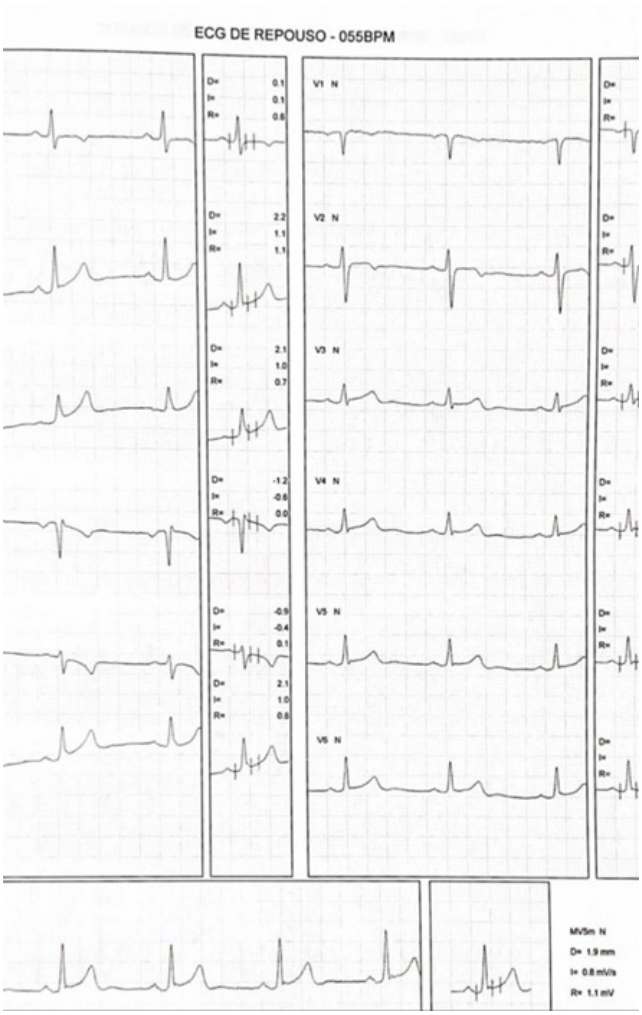

Figure 1. Exercise test at rest. The electrocardiogram indicated sinus rhythm with ventricular repolarization disturbance.

Figure 2. Exercise test after exertion. Electrocardiographic changed after exertion correspond to myocardial ischemic response patterns (ST elevation pattern).

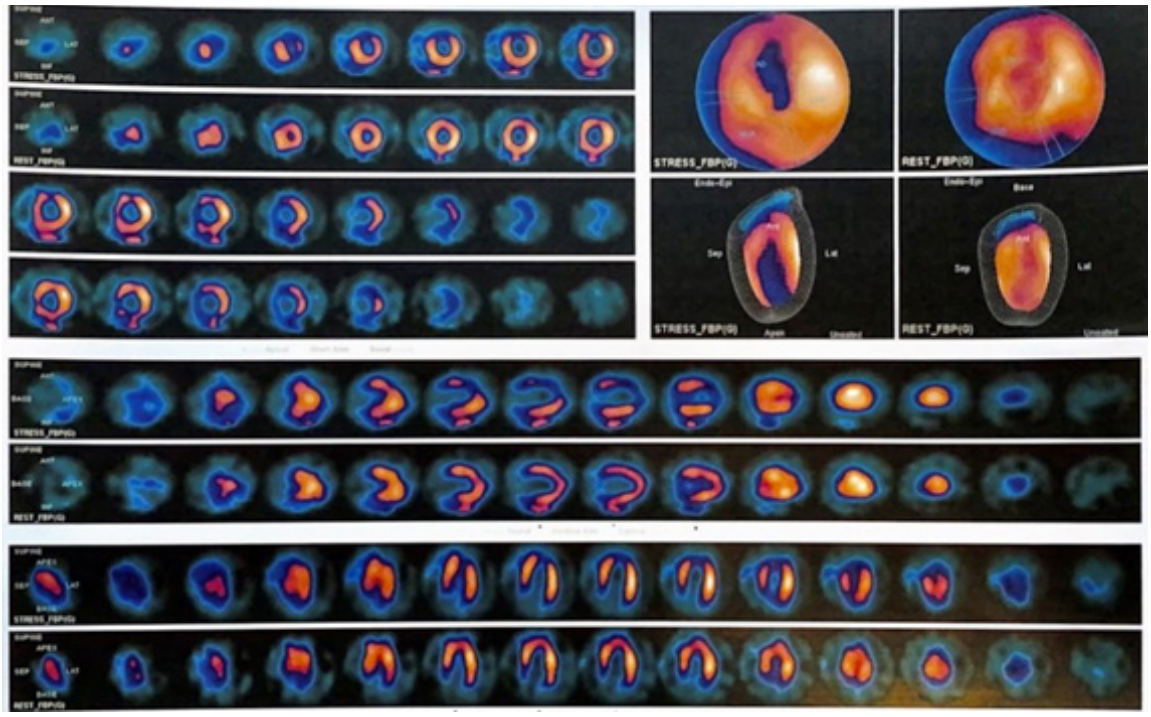

Figure 3. Myocardial scintigraphy was performed using Technetium Tc-99m sestamibi as the radiotracer pharmacological test. Concentration defects and perfusion abnormalities in the apical and anterior myocardial segments.

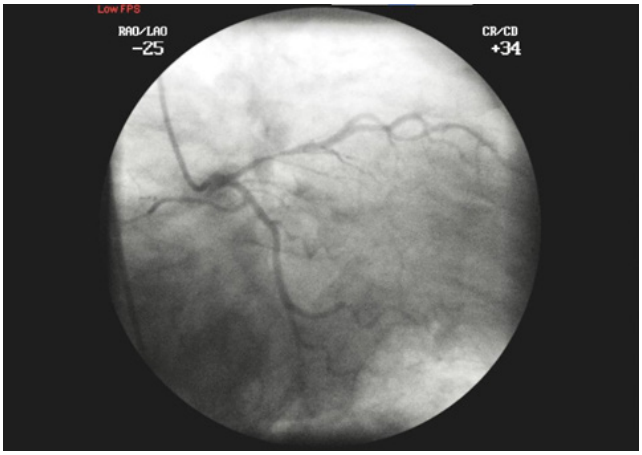

Figure 4. Left coronary artery with spasm. Coronary circulation without obstructive lesions and coronary spasms. Anterior descending artery reaches the middle third of the posterior interventricular groove with spasm in the proximal area.

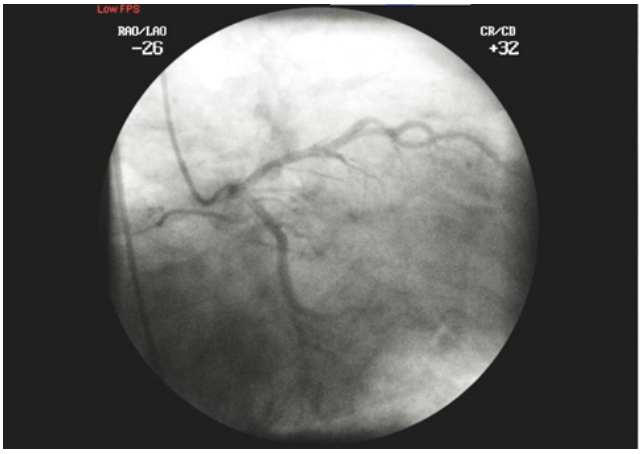

Figure 5. Left coronary artery post-injection of intracoronary nitroglycerin.

DISCUSSION

PA, also called vasospastic angina (VA) is caused by focal or diffuse coronary vasospasm, which results in severe temporary or persistent coronary artery obstruction. Risk and triggering factors such as smoking, alcohol use, stress, hyperventilation, and migraine, associated with autonomic nervous system disorders such as sympathetic and parasympathetic drugs influence the onset and intensity of manifestations. Excessive contraction of vascular smooth muscle, endothelial dysfunction, and magnesium deficiency have also been reported as contributors to the occurrence of vasospasm in patients.[11,12]

The tests performed with the patient in the case indicated that his spasm occurred in situations of physical and emotional stress, besides being caused in reaction to the provocation with dipyridamole, for about 4 minutes. In addition, the patient presents risk factors, since he was a former smoker, and a social alcohol consumer and reported stressful situations at work.

The literature indicates that the classical symptoms include typically anginal pain, oppressive with irradiation to the shoulder, mandible, inner face of the arm, and effort, whose relief occurs at rest and/or nitrate use. The patient had a clinic that differed from the literature since his symptoms include chest pain at slight exertion, weakness in the right upper limb, sweating, and a feeling of cervical stiffening.[13,14]

The gold standard diagnosis used in these cases is made from pharmacological provocative tests with a bolus of high doses of acetylcholine, methylergonovine, or ergonovine, by intracoronary injection. To determine the diagnosis, the Coronary Vasomotion Disorder International Study Group (COVADIS) created three criteria:

- Response to nitrate in the occurrence of spontaneous anginal episodes with at least one of the following: (a) angina at rest, especially between night and dawn; (b) with variable exercise tolerance and worse in the morning; (c) hyperventilation precipitates the episode; (d) calcium channel blockers (but not beta-blockers) suppress episodes.
- Transient ischemic disorders that include at least two adjacent leads with ST-segment elevations ≥ 0.1mV, ST-segment unevenness ≥ 0.1mV, or new negative U waves.
- Spontaneous coronary vasospasm or in response to provocation tests.[15]

The patient had a spasm of the anterior descending coronary artery, in its initial part during coronary angiography, in addition, the patient reported that one of the factors of the improvement of symptoms was rest, and his exercise test indicated electrocardiographic alterations consistent with the criteria of COVADIS.[15] Thus, his clinic and tests covered all three criteria for the diagnosis of PA.

Cardiac rehabilitation and physical training with behavioral therapy are the main pillars of treatment. Medications include calcium and nitrate channel blockers, and calcium channel blockers are preferred due to concerns that long-acting nitrates may develop nitrate intolerance. However, combination therapy with calcium and nitrate channel blockers can synergistically

provide relief in patients with single-agent refractory AV. Statins and angiotensin-converting enzyme (ACE) inhibitors demonstrate efficacy in preventing episodes of vasospasms and should be considered in all patients presenting with this condition.[9,16,17]

The patient studied was being treated with beta-blockers, nitroglycerin, and calcium channel blocker, medications that were adapted in dose and number of shots according to his clinic, to minimize symptoms.

Invasive treatments include stent placement, implantable cardio defibrillators (ICD), and partial sympathetic denervation. These options depend on the situation. For example, stent placement is a reasonable option in patients with persistent vasospasm due to arterial injury. On the other hand, ICD implantation can be considered for secondary prevention in patients with cardiac arrest secondary to VA. A recent publication suggested that in some patients with coronary vasospasm who have been successfully resuscitated from ventricular fibrillation or interrupted ventricular tachycardia, medical therapy with a BCC in combination with an ICD may be effective in reducing recurrent ventricular arrhythmias.[4,18]

Although VA rarely has manifestations, such as ventricular arrhythmias, patients have a higher risk of sudden cardiac death or of presenting the following risk factors: hypertension, hyperlipidemia, multivessel spasm, and spasm involving the left anterior descending artery. In the case of the patient studied, hypertension is a persistent risk factor, in addition to physical and emotional stress and previous involvement of the anterior descending artery.

In conclusion, PA is a condition that needs universal diagnostic criteria related to the spectrum of chest pain. Awareness of healthcare professionals is mandatory to decrease adverse outcomes such as myocardial infarction, arrhythmia, and sudden death. Despite medical, surgical, and pharmacological treatments, the correct understanding of this disorder will guide new treatments and pathways to improve treatments and perhaps achieve better clinical outcomes.

REFERENCES

1. Picard F, Sayah N, Spagnoli V, Adjedj J, Varenne O. Vasospastic angina: A literature review of current evidence. Arch Cardiovasc Dis. 2019;112(1):44-55
2. Tateishi K, Saito Y, Kitahara H, Takaoka H, Kondo Y, Nakayama T, et al. Vasospastic angina and overlapping cardiac disorders in patients resuscitated from cardiac arrest. Heart Vessels. 2021;36(3):321-9
3. Sheth MA, Widmer RJ, Dandapantula HK. Pathobiology and evolving therapies of coronary artery vasospasm. Proc (Bayl Univ Med Cent). 2021;34(3):352-360.
4. Kleyman R, Goyal R, Patel N, Joseph J, Akel R. Vasospastic Angina and Role of Cardiac Catheterization. Cureus. 2019;11(9):e5588.
5. Sueda S. Young Vasospastic Angina Patients Less Than 20 Years Old. Circ J. 2019;83(9):1925-8
6. Dahdouh Z, Mohamed T. Prinzmetal Angina Mimicking Severe Three-Vessel Coronary Artery Disease. J Invasive Cardiol. 2020;32(9):E240-1
7. Uran C, Di Chiara G, Bosco B, D'Andrea D, Iodice P. A case of vasospastic angina. Vasospasm physiopathology: a new therapeutic role for ranolazine? Monaldi Arch Chest Dis. 2020;90(3)
8. Kim HL, Lee SH, Kim J, Kim HJ, Lim WH, Seo JB, et al. Incidence and risk factors associated with hospitalization for variant angina in Korea. Medicine (Baltimore). 2016;95(13):e3237. Erratum in: Medicine (Baltimore). 2016;95(25):e202e
9. Ahn JM, Lee KH, Yoo SY, Cho YR, Suh J, Shin ES, et al. Prognosis of Variant Angina Manifesting as Aborted Sudden Cardiac Death. J Am Coll Cardiol. 2016;68(2):137-45.
10. Kim HL, Kim J, Kim HJ, Lim WH, Lee JY. Incidence and factors associated with mortality in 2,476 patients with variant angina in Korea. Sci Rep. 2017;7:46031.
11. Gaur A, Patibandla S, Sohal S, Monzidelis C, Garyali S. Girl Who Cried Wolf: A Case of Prinzmetal Angina With Related ST-Elevation Myocardial Infarction. Cureus. 2021;13(1):e12661.
12. Agrawal Y, Ponna PK, Halabi AR, Aloka F. Prinzmetal angina: echocardiographic captured and angiographically proven without provocative testing. BMJ Case Rep. 2020;13(9):e236353.
13. Ghadri JR, Ruschitzka F, Lüscher TF, Templin C. Prinzmetal angina. QJM. 2014;107(5):375-7.
14. Chahin M, Zoltowska DM, Al-Turk B, Suryadevara S. Vasospastic angina on coronary angiography. BMJ Case Rep. 2020;13(9):e237753.
15. Beltrame JF, Crea F, Kaski JC, Ogawa H, Ong P, Sechtem U, et al.; Coronary Vasomotion Disorders International Study Group (COVADIS). International standardization of diagnostic criteria for vasospastic angina. Eur Heart J. 2017;38(33):2565-8.
16. Matta A, Bouisset F, Lhermusier T, Campelo-Parada F, Elbaz M, Carrié D, et al. Coronary Artery Spasm: New Insights. J Interv Cardiol. 2020;2020:5894586.
17. Sawano M, Katsuki T, Kitai T, Tamita K, Obunai K, Ikegami Y, et al. Beta blockers versus calcium channel blockers for provocation of vasospastic angina after drug-eluting stent implantation: a multicentre prospective randomised trial. Open Heart. 2020;7(2):e001406.
18. Kim SR, Choi KH, Song YB, Lee JM, Park TK, Yang JH, et al. Effect of sarpogrelate and high-dose statin on the reduction of coronary spasm in vasospastic angina: A two by two factorial, pilot randomized study. Clin Cardiol. 2019;42(10):899-907.