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Case Report

Microvascular Angina, on the Purpose of a Case from Southern Colombian

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Abstract: The most common cause of myocardial ischemia and angina is coronary stenosis by atheromatous lesions in the epicardial arteries. However, a significant percentage of patients with angina and ischemia demonstrated by tests to induce it not present coronary obstructions on angiography. For this reason, the case of a 68-year-old woman is presented, who consulted for chest pain with typical oppressive characteristics, associated with autonomous symptoms, with electrocardiographic changes and elevated cardiac enzymes, given the above she received anti-ischemic, antiplatelet, and analgesic, which required coronary stratification, which was later reported within normal limits. Likewise, outpatient follow-up was carried out 3 months after the cardiovascular event, reporting within normal limits. In these cases, it is attributed to coronary spasm, endothelial dysfunction, and myocardial metabolism disorders as responsible for ischemia and its clinical manifestations. This situation constitutes a frequent and costly clinical problem, contributes to diminishing the quality of life, and presents a challenge in the diagnosis and treatment. This form of angina is not as benign as it was previously considered. We present a case in which it was not possible to demonstrated ischemia by tests performed and coronary angiography revealed no obstructive lesions.

Keywords: Microvascular Angina, Cardiac Syndrome X, No Obstructive Coronary Artery Disease, Chest Pain

1. Introduction

Atherothrombotic cardiovascular disease is the main cause of death in the world, the pathophysiological substrate of acute coronary syndromes is the rupture or fissure of an atherosclerotic plaque followed by thrombosis, vasospasm, and decreased coronary flow. Myocardial ischemia occurs due to an imbalance between blood supply and myocardial oxygen demand. The relationship between myocardial ischemia and obstructive atherosclerosis of the epicardial coronary arteries is well established. The relationship between the severity and extent of coronary artery disease is demonstrated by coronary angiography and survival [1].

However, a group of patients, especially peri- and postmenopausal women, have a clinical similar to coronary occlusive disease with positive ischemia tests by non-invasive methods, but coronary angiography does not show obstructive lesions. The prevalence of these cases has been estimated at 40% [2]. The diagnosis of normality in coronary angiography is five times more frequent in women than in men [2], and it can lead to a wrong diagnosis of chest pain of non-cardiac origin, and patients remain without any treatment when clarifying studies are suspended due to

forgetting of alterations in the coronary microvasculature. The prognosis of this group of patients is not as benign as was believed, they have an increase in mortality of 1.5 times more than the counterpart without any evidence of an ischemic process [3]. For these cases, the term microvascular angina, angina with coronary vascular dysfunction, cardiac syndrome X, and chest pain with normal coronary arteries have been used interchangeably in the literature.

We present a case of a patient with recurrent chest pain, and contrary to what was reported, the tests to induce ischemia were not demonstrative, and the coronary angiography did not reveal epicardial obstructive lesions.

2. Presentation of the Case

A 68-year-old female patient was admitted due to clinical symptoms of intense, oppressive chest pain, which radiated to the left upper limb, back, neck, and jaw, and dyspnea and profuse diaphoresis. She ingested 300 mg of acetylsalicylic acid with slow resolution of symptoms. Her history included controlled hypertension with losartan 100 mg every 12 hours and 25 mg of hydrochlorothiazide. She also used 100 mg of acetylsalicylic acid and 40 mg of atorvastatin non-continuously. She is sedentary, overweight, and without diabetes mellitus. She denied using alcohol, smoking, or psychoactive substances. No significant family history.

The pain described, but less intense, she has been presenting for six years, but in the last seven months, it has become more frequent, lasting approximately 15 minutes, sometimes related to exercise and generally during the day. Reason for which he has consulted different specialties on several occasions and among the studies carried out are several surface electrocardiograms, three conventional stress tests, three transthoracic echocardiograms, two 24-hour rhythm Holter, four chest radiographs, and various studies of Laboratories showing no abnormalities, except for an approximate HDL-C of 35 mg/dl and LDL-C of 165 mg/dl. She also has endoscopy of the upper digestive tract, simple chest tomography, ultrasound of the upper abdomen, radiography of the barium esophagus, pH meter, impedance, and esophageal manometry without abnormal findings and hospitalizations four times for the same cause.

Due to the recurrence of pain, they have also undergone stress echocardiography with exercise and dobutamine, myocardial perfusion studies at rest-effort with the same results. Two years ago and after an episode of angina, coronary angiography was performed that did not show significant lesions, a new coronary angiography was proposed with tests to provoke spasm that until now has not been performed. Upon admission, a patient was found in apparently good condition. She is 1.74 meters tall and weighs 82 kg. Vital signs: blood pressure 138/79 mmHg, Fc: 60 bpm, Fr: 14 rpm, T°: 36.7°C, ambient air oxygen saturation of 98%. The cardiac and pulmonary auscultation was normal as the rest of the physical examination.

The blood count was normal and serial troponin T was negative. Electrolytes, serum creatinine, blood glucose, thyroid profile, aminotransferases, and chest X-ray did not show alterations. The HDL-C was 34 and the LDL-C 152.

The electrocardiogram (Figure 1), taken in the absence of pain and two days after the acute episode, showed symmetric inversion of the T wave in V3 to V6, DI, aVL, and prolonged QTc (475 ms). With suspicion of electrical changes caused by compromise of the left anterior descending artery, a right radial coronary angiography was performed, which did not show obstructive lesions (Figure 2). The evolution was satisfactory and microvascular angina was diagnosed.

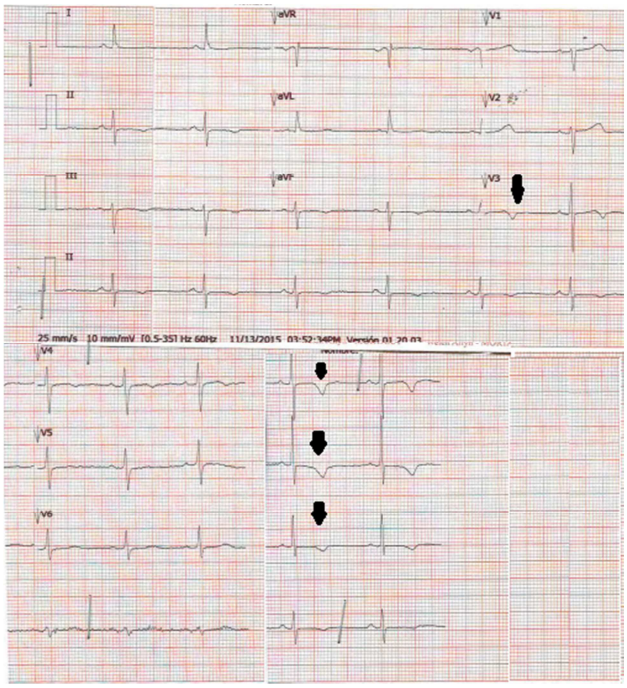

Figure 1. *Electrocardiogram on admission. Arrow indicates inversion of the T wave.*

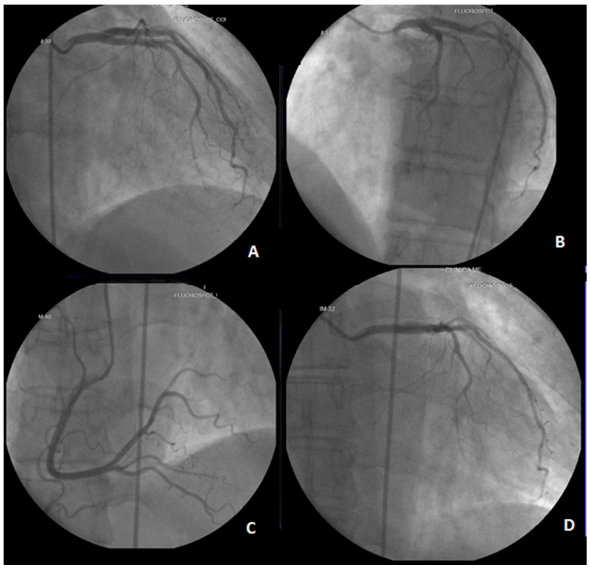

Figure 2. *Coronary angiography without obstructive lesions. (A, B, D) evidence of the left coronary artery with its anterior descending branch. (C) Evidence of the right coronary artery with its branches.*

On the third day, she was discharged with bisoprolol,

losartan, hydrochlorothiazide, acetylsalicylic acid, atorvastatin, trimetazidine, and instructions on lifestyle change and strict control on cardiovascular risk factors. An electrocardiogram taken three months after the acute episode was normal (Figure 3). So far, five months later, she is asymptomatic and maintains her cardiology check-ups.

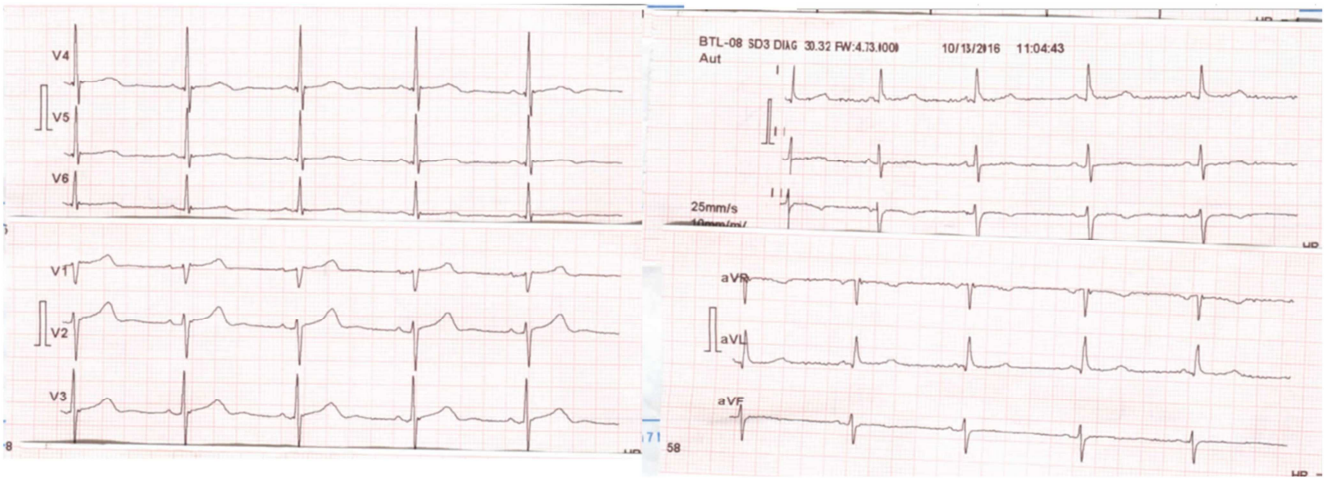

Figure 3. *Control electrocardiogram three months later.*

3. Discussion

Various studies have been carried out in patients with chest pain similar to angina, but with coronary angiography without significant lesions (obstruction <50%), but the different diagnostic criteria used have made it difficult to unify this pathology and its definition is not standardized. and is taken by exclusion [4]. The first to describe the disease was Lakoff [5], Cannon and Epstein proposed the term microvascular angina (VMA) [6] and Camici proposed that microvascular dysfunction be classified into four groups. Place in group one patients without epicardial coronary artery stenosis and the myocardial disease [1]. This group is made up of patients who have primary AMV to differentiate them from secondary AMV in which there is underlying heart disease. Based on this differentiation, some authors propose unified criteria to define primary AMV [7].

The cardiovascular health of women is strongly affected by sex-specific factors, among which is the hormonal influence. Women seem to have a lower risk of coronary heart disease with a delay of about 10 years, but it is not avoidable [8, 9], in addition, the reserve of coronary flow appears to be lower in them [10]. Only in the last three decades has coronary microvascular dysfunction emerged as an important mechanism of myocardial ischemia. This dysfunction can result from functional and/or structural alterations that occur in vessels smaller than 300 µm in diameter that is not visible in a routine coronary angiography [11]. Although three compartments have been recognized in the coronary system, there is no specific anatomical barrier between them, therefore, cardiovascular risk factors can affect coronary macro and/or microcirculation, but the pathophysiology of ischemia due to dysfunction Microcirculation coronary artery disease is more complex than that caused by epicardial coronary stenosis [11].

In the case under discussion, the two coronary angiograms performed did not show significant obstruction of the epicardial arteries despite having risk factors for cardiovascular disease. These factors have likely contributed to the dysfunctionality of the coronary microcirculation expressing itself clinically by chest pain similar to angina produced by obstructive lesions. Demonstrating this alteration is not easy and especially documenting alterations in coronary flow reserve velocity (CFRV). Various invasive and non-invasive techniques have been used without a defined cut-off point and with variable primary indicators [12]. When this situation occurs, it is likely that no technique so far is the best, but it does not impede not practicing the one that, in the opinion of the treating physician, considers which is the one that best defines the situation of a certain patient and thus approaches a more accurate diagnosis and therefore more appropriate and individual treatment. The same can be said for potential biomarkers of inflammation in coronary microvascular dysfunction [13].

The patient in the case presented pain with typical characteristics of angina and the relationship with exercise was inconsistent. It is noteworthy that the previous electrocardiograms and stress tests did not show abnormalities, except for the electrocardiogram performed on admission and two days after the painful episode and in an asymptomatic patient. This differs from what has been published, in that exercise or stress-induced tests generally show transient ST-segment depression.

The patient's recurrent chest pain can be classified as stable chronic angina, but the characteristics of pain similar to angina vs atypical angina do not differentiate between obstructive and non-obstructive coronary disease in a population of women who undergo coronary angiography and run the risk of classifying them as chest pain of non-cardiac origin, exposing them to an unfavorable cardiovascular prognosis in the future.

We consider that the patient does not clinically have pure

vasospastic angina, despite not having been proven, because here the pain is at rest, generally nocturnal, exercise tolerance is preserved and is associated with transient elevation of the ST segment. This case could be considered stable microvascular angina.

The number of studies carried out on the patient to identify the etiology of the pain is striking, some of which are not without risk. Cases like this usually occur frequently in clinical practice, making AMV not only a very frequent entity but also very expensive for the health system. The health cost of a woman with AMV has been estimated to be one million dollars over a lifetime [14]. This disease is a public health problem.

As stated, ischemia caused by coronary microvascular dysfunction explains the discrepancy between symptoms and coronary angiography and can be demonstrated by assessing CFRV. As characteristic symptoms and stress tests do not identify people with compromise in CFRV, it is necessary to demonstrate this alteration to classify them properly. Furthermore, this alteration has been proposed as an independent parameter in risk assessment in these cases [15]. Among the different methods, non-invasive techniques such as positron emission tomography, Cardiac magnetic resonance imaging, and transthoracic echocardiographic Doppler of the left anterior descending artery emerge. This last study, although not widely disseminated, is feasible and of good quality inexperienced people [18].

Another striking fact of the case is the QTc prolongation, which was maintained two days after presenting the painful episode and in an asymptomatic patient. Unfortunately, no serial electrocardiographic recordings were taken to assess when the alterations found on admission normalized. The Framingham formula is considered more reliable than Bazett's in the determination of QTc in cases of low heart rate because it is not underestimated [16]. QTc prolongation has been considered a new predictor of cardiovascular risk in unstable angina, myocardial infarction and has adverse prognostic implications. We do not know what implications it may have for microvascular angina such as the one in this case, which probably reflects extensive and severe myocardial ischemia and can lead to life-threatening ventricular arrhythmias.

Currently, there is no specific treatment. Efficacy has been demonstrated at the individual level but without being able to establish general guidelines. They include lifestyle modification, anti-anginal, anti-atherosclerotic, and anti-ischemic medications. Nonpharmacologic options include cognitive behavioral therapy, external counterpulsation, posterior cord neurostimulation, gangliectomy or stellate ganglion block, and cardiac rehabilitation.

In conclusion, AMV is a common disease and should be suspected in patients who consult for chest pain, in whom the usual tests used in the diagnosis of angina, including coronary angiography, do not show alterations. A standardized definition of AMV is necessary.

Financing

This research has not received any specific grant from agencies in the public, commercial, or non-profit sectors.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Ethical Responsibilities

To carry out the research, the ethical aspects of the Declaration of Helsinki and resolution 8430 of the Ministry of Health of Colombia [17, 18] were taken into account, classifying this research at a minimum risk level.

a. *Protection of people and animals.* The authors declare that no experiments were performed on humans or animals for this research.
b. *Confidentiality of the data.* The authors declare that they have followed the protocols of their work center on the publication of patient data.
c. *Right to privacy and informed consent.* The authors declare that no patient data appear in this article.

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