Spontaneous coronary artery dissection as a cause of ST-segment elevation myocardial infarction

Dissecção espontânea de artéria coronária como causa de infarto agudo do miocárdio com supradesnivelamento do segmento ST

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ABSTRACT – Spontaneous coronary artery dissection is an uncommon condition, and the patients’ clinical presentation is often underestimated due to few risk factors for atherosclerotic disease. Treatment must be individualized, with conservative therapy as the first option, respecting the criteria for referral for interventional treatment. We report a case of spontaneous coronary dissection, initially manifested as a non-ST segment elevation acute coronary syndrome, progressing to transmural infarction, in a young patient, with few risk factors for coronary artery disease, and give examples of difficulties related to the percutaneous approach.

Keywords: Coronary artery disease; Myocardial infarction; ST segment elevation myocardial infarction

INTRODUCTION

The first case of spontaneous coronary artery dissection (SCAD) was described by Pretty in 1931.¹⁻³ This condition is an uncommon cause of acute myocardial infarction (MI),⁴⁻⁵ accounts for 0.1% to 4% of acute coronary syndrome cases,⁴,⁵ and affects mainly young and/or female patients.⁵⁻⁷ Conservative treatment is the preferred approach, and revascularization is reserved for cases of ischemia that are refractory to medical treatment or for high-risk situations, such as hemodynamic instability or involvement of the left main coronary artery.⁵⁻⁷

The aim of this study was to report a case of a female patient, middle-aged, initially diagnosed with non-ST segment elevation acute coronary syndrome, who progressed with dynamic electrocardiographic changes and ST segment elevation, in addition to uncontrolled pain, and underwent urgent percutaneous myocardial revascularization.

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CASE REPORT

A 51-year-old woman, previously hypertensive and former smoker, with anxiety disorder and with four previous abortions. She sought emergency service complaining of precordial pain, which had started 7 hours before and had worsened one hour before, a tightness sensation of moderate intensity, irradiating to the left upper limb, back and tongue, accompanied by dyspnea, vertigo and diaphoresis.

She was hemodynamically stable, and an initial electrocardiogram (ECG) showed no acute ischemic changes. Initially, an anxiety attack was suspected and she was medicated with diazepam, but laboratory tests showed positive troponin in a curve (0.595mg/dL, 0.932mg/dL and 0.508mg/dL – reference value <0.1mg/dL), and was diagnosed as a non-ST-segment elevation myocardial infarction.

Acetylsalicylic acid 300mg, clopidogrel 300mg, and enoxaparin 1mg/kg were prescribed, in addition to statin and beta-blocker.

On the second day of hospitalization, the ECG showed inversion of the T wave in the anterior wall, and on the third day, the patient had recurrence of severe chest pain, associated with electrocardiographic alteration with ST-segment elevation in the inferior wall, with inversion of the T wave in the anterior and inferior wall.

Intravenous therapy with nitroglycerin was started, and the patient progressed with ST-segment elevation also in the anterior wall (Figure 1). She was referred to urgent coronary angiography, which showed extensive spontaneous dissection of the left anterior descending artery (LAD) (Figure 2). After crossing a guidewire through the
true lumen of the vessel, a percutaneous coronary intervention (PCI) was performed with the implantation of two drug-eluting stents.

The patient maintained severe precordial pain at the end of the procedure, and was immediately re-studied, and the results showed proximal retrograde dissection of LAD and the first marginal branch (Figure 3).

A new stent was implanted with an overlap in the proximal third of the LAD. In the angiographic control, opacification of the distal LAD bed was not observed after the distal border of the last stent. We chose to maintain a conservative treatment, both of this vessel and of the dissection of the first marginal branch, due to the resolution of the precordialgia and the regression of the ST-segment elevation in the ECG (Figure 4).

The echocardiogram estimated a left ventricular ejection fraction of 68% using the Simpson method, with akinesia of the apical and inferoapical segments. The Doppler ul-

Figure 3. Control coronary angiography after initial angioplasty of the left anterior descending artery. In right anterior oblique caudal views (A) and left anterior oblique caudal views (B), a retrograde dissection of the left anterior descending artery and marginal branch is observed.

Figure 4. Coronary angiography showing the result of the procedure. (A) Right anterior oblique caudal view shows marginal branch dissection, maintained under conservative treatment. (B) In a right anterior oblique cranial projection, three stents are observed in the left anterior descending artery, with no opacification of the distal bed of this coronary vessel.
Spontaneous coronary artery dissection is defined as a coronary artery dissection that is not associated with atherosclerosis, trauma or iatrogenesis. It is a relevant cause of acute coronary syndromes and sudden death in patients, especially in young women and patients with few conventional risk factors for atherosclerosis. Most studies on the topic are in the form of case reports or case series. The actual prevalence of the disease is still uncertain due to underdiagnosis. These patients are at risk of receiving alternative diagnoses or being discharged after being evaluated in health services because they are relatively young and often without risk factors for atherosclerosis, which is not the expected phenotype for patients with acute MI. Initially, SCAD was known as a rare and mostly fatal disease in women in the puerperium. Currently, evidence shows that this disease is more common than previously imagined. The most affected population is young women, in which SCAD is a possible cause in up to 24% to 35% of MI cases in female patients aged up to 50 years. Men are affected less frequently (less than 10% to 15% of cases).

According to the prevalence reported in cohort studies, the most frequently associated risk factors are fibromuscular dysplasia (25% to 86%), use of hormone therapy (10.7% to 12.6%), multiparity (8.9% to 10%), pregnancy (2% to 8%), systemic inflammatory disease (<1% to 8.9%), and known arteriopathy or connective tissue disease (1.2% to 3%). The most affected population is young women, in which SCAD is a possible cause in up to 24% to 35% of MI cases in female patients aged up to 50 years. Men are affected less frequently (less than 10% to 15% of cases).

Ischemia is generated, in these cases, by the formation of an intramural hematoma with consequent luminal obstruction, by the rupture of the intima layer or formation of an intraluminal thrombus. The pathophysiology is not clear, and two theories have been described. The first one proposes that the initial event is a rupture in the inner layer of the vascular wall, allowing the true lumen blood to flow through the false lumen. The second one proposes that the primary event would be a spontaneous hemorrhage from the vasa vasorum that infiltrates the vascular wall.

Although there is a wide spectrum of clinical presentations and severity of SCAD, patients who survive and seek medical attention almost always present with acute coronary syndrome with elevated myocardial necrosis markers, as in the case reported.

Evidence suggests that PCI is associated with an increased risk of complications and suboptimal outcomes, with a risk of iatrogenic dissections or extension of spontaneous dissections or intramural hematomas induced by the procedure. After PCI, dual antiplatelet therapy should be administered, according to the type of stent implanted.

There are few publications on surgical myocardial revascularization. Bypass grafting is described as a treatment strategy for SCAD in patients with left main coronary artery lesions or proximal coronary artery disease, after PCI failure or complications, or when there is refractory ischemia despite conservative treatment.

Hence, conservative treatment is generally preferred over other strategies, in clinically stable patients with...
no evidence of recurrent ischemia. This strategy is also appropriate in patients with occlusion of distal vessels or branches, who would not routinely be submitted to PCI. In the clinical case described, PCI was chosen due to the symptoms and an electrocardiographic evidence of severe ischemia. The complication that occurred after the procedure was predictable, as described, and a new intervention was performed only in the main artery, which had greater territory at risk, and conservative treatment of the branch which was secondarily affected was maintained.

Drug therapy with a statin is not routinely recommended in these cases, and should be applied according to indications for primary prevention of atherosclerotic disease. The use of beta-blockers, angiotensin-converting enzyme inhibitors or angiotensin receptor blockers is not consensual, and it is indicated in patients with ventricular dysfunction or for management of hypertension. Complementary antianginal therapy, with nitrates, calcium channel blockers and ranolazine, can be considered according to the symptoms and tolerance of patients.

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**DECLARATION OF CONFLICTS OF INTEREST**

The authors declare there are no conflicts of interest.

**CONTRIBUTION OF AUTHORS**

Conception and design of the study: JAF; data collection: SOB and RRC; data interpretation: JAF and GGMM; text writing: SOB and RRC; approval of the final version to be published: EGMJ and TON.

**REFERENCES**