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Rapid progression of coronary artery stenosis revealed by stress echocardiography

Mariana FLORIA[1,2], MD; Antoine GUEDES[1], MD; Erwin SCHROEDER[1], MD

[1]Department of Cardiology, CHU Mont-Godinne, Université Catholique de Louvain, Yvoir, Belgium; [2]II Medical Clinic, "Sf. Spiridon" University Hospital, University of Medicine and Pharmacy "Gr. T. Popa," Iasi, Romania.

Abstract We present the case of a patient with initially insignificant coronary atherosclerosis with rapid progression revealed by dobutamine stress echocardiography, despite the absence of a major risk factor. A 61-year-old woman, complaining of chest pain, palpitations and dyspnoea on exertion, was referred to our department for outpatient assessment. Coronary angiography performed two months earlier revealed an insignificant stenosis of the proximal left anterior descending coronary artery. Holter monitoring revealed malignant ventricular arrhythmias during angina episodes. The results of maximal treadmill exercise testing were negative, but those of the dobutamine stress echocardiography were positive. The angiographic re-evaluation revealed a rapid progression of stenosis of the proximal left anterior descending coronary artery. Percutaneous coronary angioplasty with stenting was successfully performed. The outcome of patients with insignificant angiographic stenosis and no major risk factor is not necessarily favourable. Therefore, these patients should receive intensive therapy for the management of risk factors and careful clinical monitoring, including dobutamine stress echocardiography.

Keywords *Angina – coronary artery stenosis – dobutamine stress echocardiography.*

CASE REPORT

A 61-year-old woman complaining of chest pain, palpitations and dyspnoea on exertion was referred to our department for outpatient assessment. She had no antecedent of cardiovascular disease, but presented with several cardiovascular risk factors, including a positive family history, stress and mild hypercholesterolaemia. Medical history revealed a stenosis of the proximal left anterior descending coronary artery of 30%, documented by coronary angiography performed two months earlier (figure 1A). Medical treatment consisted of antiplatelet drugs (aspirin), statins and angiotensin-converting enzyme inhibitors. The clinical examination and 12-lead electrocardiogram (ECG) at rest were normal.

Address for correspondence:

Mariana Floria, MD, University Hospital UCL of Mont-Godinne, Av. G. Therasse, 1, 5530 Yvoir, Belgium. E-mail: floria_mariana@yahoo.com

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Ambulatory Holter monitoring revealed malignant ventricular arrhythmias of the "torsades de pointes" type, associated with a prolonged corrected QT interval during angina episodes, precipitated by cold and physical exercise, despite treatment with calcium blockers (amlodipine 5 mg) (figure *2*). The maximal treadmill exercise test results were negative. A conventional dobutamine stress echocardiography was performed (with increments of 10 μg/kg/min every 3 min up to a peak dose of 40 μg/kg/min). The maximum heart rate reached was 107% of the maximum age-predicted rate. No change in left ventricular wall motion was detected at rest, or with low and peak doses of dobutamine (the wall motion score with the 17-segment model scoring system was 1 for each stage). During the late recovery phase of the stress test (10 minutes after the peak of dobutamine), the patient developed severe chest pain, anteroseptal ST-segment elevation of 1 mm and inferior ST-segment depression associated with complex ventricular arrhythmias (such as non-sustained ventricular tachycardia and frequent, polymorphic, premature ventricular contractions), and a wide, transient apical akinesia with preserved basal segments mimicking an apical ballooning syndrome. A transient intraventricular pressure gradient

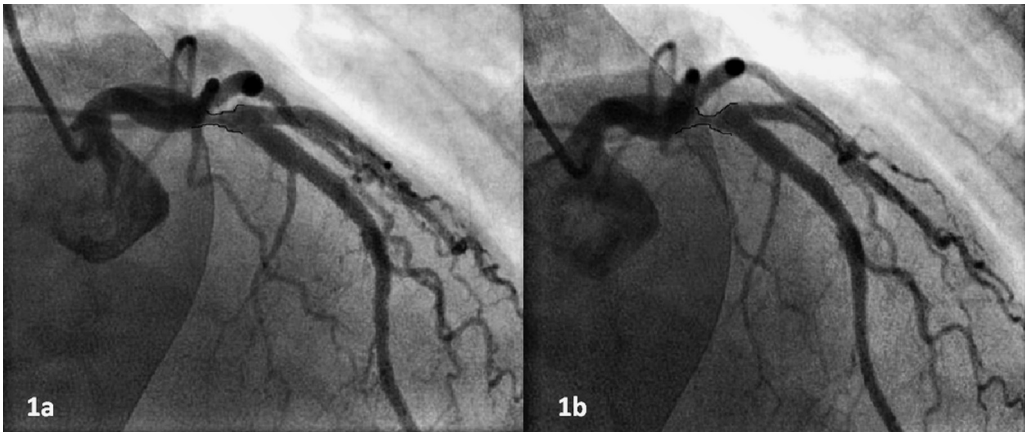

Fig.1 Angiographic appearance of the proximal left anterior descending coronary artery with a severity of stenosis of approximately 30% (left image) and 60% (right image) at the time of the first examination and two months later, respectively.

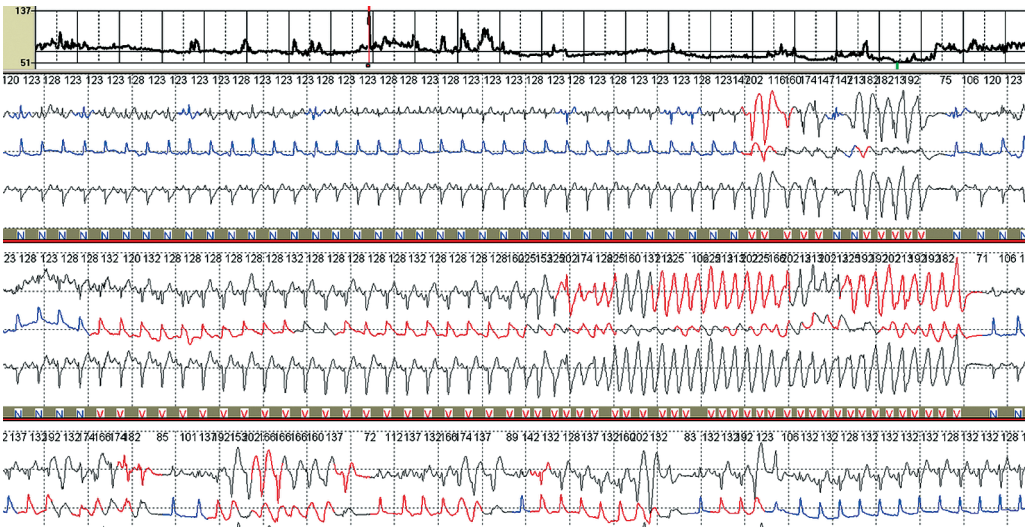

Fig. 2 Repetitive "torsades de pointes" episodes detected during chest pain with Holter monitoring.

of 29 mmHg and a left ventricular systolic function deterioration were observed. The global longitudinal strain rate dramatically increased, from –20% (at the dobutamine peak) to 0% (during the late recovery phase). The angiographic re-evaluation showed a rapid progression of stenosis to 60% of the proximal left anterior descending coronary artery, and no new lesion (figure 1A). Percutaneous coronary angioplasty with stenting (BMS) was successfully performed despite the presence of moderate lesions. A new dobutamine stress echocardiography was performed immediately after the procedure (in the catheterization laboratory), and the results were negative. The patient received specific medical treatment and did not have any new episode of angina during the following nine months.

DISCUSSION

A rapid increase in stenosis severity with atherosclerotic plaque progression often reflects the forthcoming occurrence of acute coronary events. These events are most commonly precipitated by mild or moderate coronary stenosis that becomes severely obstructive. In patients with mild to moderate coronary artery stenosis and no major risk factor, atherosclerotic plaque progression is usually slow, evolving gradually over time. Transient dyssynergy during dobutamine stress echocardiography constitutes an early, sensitive, specific marker of transient ischaemia, clearly more accurate than ECG changes and pain[1]. We present here the case of a patient with initially insignificant coronary atherosclerosis (30% of stenosis severity) progressing rapidly and associated with vasospastic angina (despite treatment with calcium blockers) and complex ventricular arrhythmias detected during the late recovery phase of dobutamine stress echocardiography. The ischaemic response was noted during the recovery phase of dobutamine stress echocardiography. It has been reported that an ischaemic response may occasionally develop after cessation of drug infusion during dobutamine stress echocardiography. The European guidelines on stress echocardio-

graphy recommend scanning during the recovery phase to detect late wall motion changes [1]. Dobutamine stress-induced takotsubo syndrome has been previously described, with changes occurring either during the peak stress[2] or during the recovery phase[3]. In the present case, echocardiographic imaging during the recovery phase indicated that a vasospasm of the left anterior descending plaque of the coronary artery was probably mimicking an apical ballooning syndrome. The evolution of the insignificant lesion was very unusual in this case. Despite the absence of a major risk factor, such as diabetes mellitus, the atherosclerotic plaque progressed rapidly, in association with vasospastic angina and malignant arrhythmias. Therefore, it remains questionable whether patients with insignificant angiographic stenosis and no major risk factor are safe in the short term. Dobutamine stress echocardiography could provide an answer and help assess the true severity of lesions, even during the follow-up of patients without a major risk factor. Indeed, it is well known that dobutamine stress echocardiography is effective in predicting cardiac death during long-term follow-up[4].

In conclusion, the outcome of patients with insignificant angiographic stenosis (severity <50%) and no major risk factor is not necessarily favourable. Therefore, these patients should receive intensive therapy for management of risk factors and careful clinical monitoring, including dobutamine stress echocardiography.

CONFLICT OF INTEREST: none.

REFERENCES

1. Sicari R, Nihoyannopoulos P, Evanghelista A, Kasprzak J, Lancellotti P, Poldermans D, Voigt JU, Zamorano JL; European Association of Echocardiography. Stress echocardiography expert consensus statement. *Eur J Echocardiogr* 2008; **9**: 415-37.
2. Margey R, Diamond P, Mc Cann H, Sugrue D. Dobutamine stress echo-induced apical ballooning syndrome (Takotsubo) syndrome. *Eur J Echocardiogr* 2009; **10**: 395-9.
3. Shah BN, Simpson IA, Rakhit DJ. Takotsubo (apical ballooning) syndrome in the recovery period following dobutamine stress echocardiography: a first report. *Eur J Echocardiogr* 2011; **12**(1): E5.
4. Sicari R, Pasanisi E, Venneri L, Landi P, Cortigiani L, Picano E; Echo Persantine International Cooperative (EPIC) Study Group; Echo Dobutamine International Cooperative (EDIC) Study Group. Stress echo results predict mortality: a large-scale multicenter prospective international study. *J Am Coll Cardiol* 2003; **41**: 589-95.