Clinical note

Acute stent thrombosis and reverse transient left ventricular dilatation after performing a single-photon emission computed tomography myocardial perfusion

B. Miranda, M.N. Pizzi, S. Aguadé-Bruix, E. Domingo, J. Candell-Riera

Servicio de Cardiología, Hospital Universitari Vall d’Hebron, Barcelona, Spain
Servicio de Medicina Nuclear, Hospital Universitari Vall d’Hebron, Barcelona, Spain

Abstract

A 63-year-old male patient with a history of stent implantation in the left anterior descending artery three months before is presented. Due to the onset of vegetative symptoms, he was referred for gated-SPECT myocardial perfusion. During acquisition of the resting images he presented chest pain and ST segment elevation, so that urgent coronary angiography was performed, showing stent thrombosis. Rest perfusion imaging showed anterior and apical perfusion defects, more severe and extensive than in the stress images, with striking left ventricular dilatation and a fall in the ejection fraction related to the acute ischemia phenomenon. Intense exercise is associated with a transient activation of the coagulation system and hemodynamic changes that might induce thrombosis, especially in recently implanted coronary stents that probably still have not become completely endothelialized.

Keywords:
Acute stent thrombosis
Transient reverse ventricular dilatation
Single-photon emission computed tomography
Myocardial perfusion
Ischemic heart disease

Keywords:
Trombosis aguda de stent
Y dilatación transitoria ventricular izquierda inversa tras la realización de una tomografía computarizada de emisión monofotónica de esfuerzo

Palabras clave:
Trombosis aguda stent
Dilatación transitoria ventricular inversa
Tomografía computarizada de emisión monofotónica
Perfusión miocárdica
Cardiopatía isquémica

Introduction

To perform an exercise gated SPECT in patients with a history of percutaneous revascularization and clinical symptoms is considered an appropriate indication of this technique. The safety of performing this procedure soon after the implantation of a stent is not well established, and there are some reports published regarding acute stent thrombosis after performing a stress test.

Case

A 63-year-old patient, former smoker, hypertensive, dyslipemic, with previous acute myocardial infarction was treated with primary angioplasty and conventional stent in the left anterior descending artery (LAD), with a good angiographic outcome was treated. The catheterization also showed moderate injuries in the proximal LAD and circumflex artery, and post-infarction ventricular function was slightly depressed. Three months after infarction a gated-SPECT myocardial perfusion stress was carried out because he complained of nausea and occasional aerophagia unrelated to efforts without chest pain. The baseline ECG showed a pattern of anterior necrosis (Fig. 1A). The patient reached 85% of the theoretical maximum heart rate for his age and 8.5 METs, with an appropriate increase in blood pressure, without presenting symptoms or significant electrocardiographic abnormalities. Scintigraphic images were acquired after the stress...
and 30 min later, during the acquisition of the resting images, the patient presented mild chest pain, that he did not refer. After acquisition of images, the pain intensified and the patient vomited. In that moment, ECG showed elevation of the ST segment in V₁ to V₃, up to 3 mm, and pseudonormalization of T waves in the inferior wall (Fig. 1B). Aspirin (300 mg) and sublingual nitrates were administered without decrease of pain and with persistent electrocardiographic changes. Then, 600 mg of clopidogrel was indicated and an emergency coronary angiography was performed that showed an acute intra-stent thrombotic occlusion (Fig. 2A). The intravascular ultrasound images showed a significant focal thrombosis with stent stenosis. Thrombectomy was performed, intracoronary abciximab was administered and a drug-eluting stent was implanted, with an optimal result (TIMI 3) (Fig. 2B). In the images of the gated SPECT a perfusion defect was observed in the anterior and apical regions, more severe and extensive in the resting images, with a greater dilatation of the left ventricular cavity at rest than during stress, suggestive of left ventricular dilatation during the phenomenon of acute ischemia at rest (Fig. 3). The functional analysis showed a left ventricle ejection fraction (LVEF) of 58% with an end diastolic volume (EDV) of 107 ml and an end systolic volume (ESV) of 45 ml in the images corresponding to the effort. In the resting images a fall in LVEF (45%) and an increase of the ventricular volumes (EDV: 120 ml and ESV: 65 ml), with an inverse TID (Transient Ischemic Dilatation) of 0.79 (78/98) (Fig. 4), were documented.
Fig. 3. Myocardial scintigraphy shows an anterior and apical perfusion defect, more severe and widespread at rest, with dilatation of the left ventricular cavity at rest with respect to stress.

Discussion

Gated-SPECT myocardial perfusion is a test used in monitoring patients with a history of percutaneous coronary revascularization. Appropriate criteria for the use of this test recommend the realization of a SPECT in this context, in symptomatic patients or in patients who have received incomplete revascularization. In asymptomatic patients, the indication is considered after two years of percutaneous revascularization.\(^8\) When it is performed in stable patients, it has a low complication rate. However, there are some cases of stent thrombosis associated with the implementation of both conventional stress test\(^1,3\) as in the context of myocardial perfusion SPECT.\(^2\) The role of exercise as a promoting factor of stent thrombosis is not completely clear. The factors that have
been related to this phenomenon are the inherent thrombogenicity of the stent, an exercise-induced activation and hyperreactivity of platelets, and a possible rupture of the arterial intima by stress in the vessel wall secondary to increased pressure and blood flow during exercise.\(^1\) Kumpuris et al. demonstrated that patients with coronary artery disease had higher levels of platelet aggregation (thromboxane A2) during exercise testing than patients in the control group.\(^5\)

Our report shows a patient who, after three months of percutaneous revascularization of the left anterior descending artery, had an acute stent thrombosis after performing a SPECT myocardial perfusion stress indicated by the onset of autonomic symptoms suggestive of angina. According to the guidelines, the indication of the test was appropriate but as it has been described in other cases in the literature, there was a late stent thrombosis. And because thrombosis occurred during the acquisition of the scintigraphic images of rest, a transient ischemic dilatation of the left ventricle was documented in that moment.

The phenomenon of transient ischemic dilatation is frequently observed in the stress images when ischemia is significant enough to affect the ventricular function and increase the ventricular volumes, and this has been described as a marker of severe and extensive coronary artery disease.\(^5,7\) Although there are reports of more severe ischemic defects at rest with respect to stress in patients with vasospastic angina triggered at post-exercise,\(^4\) this is the first documented case in the literature regarding inverse transient dilatation due to a severe impairment of ventricular function at rest, as it was the moment of stent occlusion.

Thus, although stent thrombosis associated with exercise testing after percutaneous revascularization is rare, it can occur in some patients. For this reason, it should only be performed following appropriate indication criteria. If the phenomenon of thrombosis occurs during rest, ventricular function may be affected in the same way as in the context of significant ischemia during the stress, leading to a transient reverse left ventricular dilatation.

**References**