Recurrent angina in a diabetic patient

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Case report

A 69-year-old male patient with a history of hypertension, dyslipidaemia, and longstanding non-insulin dependent type 2 diabetes mellitus was referred to our division due to recurrent angina.

Medical history

In 1997, for exertional angina, he underwent coronary angiography, showing a chronic total occlusion of the right coronary artery and a 90% stenosis of the apical left anterior descending (LAD) coronary artery that was treated with balloon angioplasty (plain old balloon angioplasty (POBA)).

In 2003, he was diagnosed with prostate cancer; in the pre-surgical work-out, an exercise stress test was performed that showed effort-induced myocardial ischaemia. The patient was then referred for repeat coronary angiography that revealed a critical stenosis of the obtuse marginal coronary branch (OMB), treated by percutaneous coronary intervention (PCI) and bare metal stent implantation, and a subcritical mid-LAD stenosis. Six weeks later, the patient underwent uncomplicated, successful prostatectomy.

In 2006, because of a positive exercise stress test, the patient underwent a new angiogram revealing an 80% focal stenosis on the mid-LAD that was treated with PCI and drug eluting stent (DES) implantation.

In 2009, for recurrent exertional angina, a fourth coronary angiography was performed: it showed mid-LAD in-stent restenosis (ISR), 90% apical LAD stenosis, subcritical stenosis of two diagonal branches, and good angiographic result of the previous PCI on the OMB. A POBA for LAD-ISR and a PCI with DES implantation on the apical LAD were performed.

At discharge the exercise stress test was negative, and the patient was released with secondary prevention therapy as well as metoprolol tartrate 50 mg b.i.d.

In 2010, the patient complained with recurrent exertional angina. At admission the ECG showed left bundle branch block (LBBB) (Figures 1 and 2), the echocardiographic examination revealed mild impairment of left ventricular systolic function (EF: 44%) with inferior wall akinesia. Physical examination was unremarkable. Blood testing revealed a borderline glycaemic control (HbA1c = 7.5%), well-controlled lipid profiles total cholesterol: 17.4 mg/dL; low density lipoprotein (LDL) 76 mg/dL; triglycerides 108 mg/dL).

An exercise stress-echocardiogram demonstrated inducible ischaemia in the LAD territory so the patient was referred to the cath-lab; coronary angiogram revealed a 90% stenosis of the mid-LAD starting downstream of the distal edge of the previously implanted stent (Figure 3); the aforementioned lesion was successfully treated by PCI and third generation everolimus eluting stent implantation.

After a negative exercise stress-echo, the patient was discharged and the anti-ischaemic therapy was optimized, stopping the beta-blocker, because of the diabetes and the LBBB, as well as decreased left ventricular function (LVF), including trimetazidine and calcium-channel blockers along with the antiplatelet agents, angiotensin converting enzyme (ACE) inhibitors, statins and oral antidiabetic drugs.

The patient has been asymptomatic since then.

At the latest follow-up visit, a recovery of left ventricular systolic function with an EF of 52% was reported at echocardiography.

Discussion

Diabetes is known to be a major risk factor for cardiovascular diseases and its epidemiological burden is increasing worldwide; adverse cardiovascular events are nowadays the leading causes of diabetes-related morbidity and mortality.

The management of ischaemic heart disease in diabetic patient is still challenging.

Part of this challenge is the fact that cardio vascular (CV) dysfunction and cardiomyopathy are much higher in diabetic patients after adjustment for arterial hypertension (AH), body mass index (BMI) hypercholesterolaemia and other risk factors (Framingham).

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We described a case of a patient with type 2 diabetes mellitus that experienced recurrent angina due to both progression of coronary atherosclerosis and recurring ISR. In-stent restenosis is more frequent in diabetic patients and may affect long-term outcome. The pathogenesis of ISR is not fully understood even though it is probably multifactorial, inflammatory response and mechanical stress playing a major role and leading to neointimal hyperplasia which is pathogenic of ISR. Multiple contributory factors have been identified, but clear understanding of the overall underlying mechanism is still lacking.

DES ISR rate varies from 3% to 20% of patients, depending on patient, lesion characteristics, and stent type. The clinical presentation of ISR is usually recurrent angina, but some patients may present with acute coronary syndrome.

Moreover, in the diabetic heart there is a dramatic shift away from glucose utilization to free fatty acid (FFA) as the main energy substrate (cardiomyocytes rely 90-100% on FFA as an energy source), which leads to loss of metabolic flexibility and less efficient adenosine triphosphate (ATP) production. At the same time the accumulation of fatty acid (FA) and FA derivates, causes loss of ATP for futile cycling of the FA derivates, lipotoxicity, and deterioration of cardiac function. That is why we considered inclusion of an agent like trimetazidine, which shifts the cardiac metabolism from FA oxidation to the more efficient pathway of glucose oxidation¹ known to improve both angina symptoms and LVF, as indispensable in this patient.

This patient has been asymptomatic since the prescription of an intensive therapy including trimetazidine.

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Reference

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