A CASE REPORT AND LITERATURE REVIEW ON MYOCARDIAL INFARCTION WITH NORMAL CORONARY ARTERIES

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ABSTRACT

Myocardial infarction associated with normal coronary arteries is a well-known condition, although it is generally associated with obstructive coronary artery disease. The overall prevalence rate of myocardial infarction with normal coronary arteries is considered to be low, varying from 1% to12%.

Here we describe a case of a 52-year-old woman with a history of prior myocardial infarction who continued to be asymptomatic after a 10-year follow-up, in the absence of a high-risk profile for adverse outcomes. She was studied with whole-body angiography and multi-slice coronary computed tomography, which showed normal coronary and extra-coronary arteries.

Keywords: *Coronary artery disease, myocardial Infarction, computed tomography, angiography, literature review.*

INTRODUCTION

Myocardial infarction (MI) with normal coronary arteries is a medical condition, which is a challenge in medical practice because of the lack of evidence-based medical data on its prognosis and on secondary prevention. The prevalence of MI with normal coronary arteries has always been considered low, varying between 1% and 12%. More clinical trials is needed for this population group affected by coronary heart disease (CHD), as it involves a considerable number of patients, [1-3].

Here we describe a case of an adult female with a history of prior myocardial infarction who continued to be asymptomatic after a 10-year follow-up, in the absence of a high-risk profile for adverse outcomes. She was studied with whole-body angiography and multi-slice coronary computed tomography, which showed normal coronary and extra-coronary arteries.

CASE PRESENTATION

A 52-year-old woman with medical history of hypertension and previous MI was referred to our department for a cardiological follow-up visit. She was a non-smoker, non-drug abuser and has no history of diabetes mellitus, hypercholesterolemia or premature coronary artery disease in her family. She was not on any hormonal replacement therapy.

She was treated with systemic thrombolysis, unfractioned heparin, aspirin, atenolol and intravenous nitroglycerine for an inferior MI, ten years earlier. Her laboratory tests such as serum glucose, lipids, blood count, liver-, kidney- and thyroidfunction tests were within normal limits and her echocardiogram (ECG) revealed akinesis of the posterior-basal wall with an estimated ejection fraction of 50%. She had a stress ECG negative for inducible ischemia on day sixth and was discharged on the seventh day with a drug regimen of aspirin, atenolol, captopril, simvastatin and isosorbide dinitrate.

After the MI and prior to the visit to our department, the patient had been free from chest pain and dyspnea and had a normal exercise tolerance. She had periodical ECGs that showed the presence of akinesis of the posterior-basal wall with a mildly depressed systolic function. She reported a good control of arterial blood pressure with the ongoing therapy that includes perindopril 5mg/day, hydroclhorothiazide 25 mg/day and atenolol 25 mg/day associated with aspirin and simvastatin 20 mg/day. A physical examination showed blood pressure of 130/80 mmHg, heart rate of 70 bpm, BMI of 27 kg/m^2, waist circumference of 82 cm and no findings of congestive heart failure. The resting ECG showed a sinus rhythm at 65 bpm and the presence of Q waves in II, III and aVF leads with no other abnormalities.

Laboratory tests revealed a total serum cholesterol of 160 mg/dl, HDL cholesterol of 55 mg/dl, triglycerides of 78 mg/dl, LDL cholesterol of 89 mg/dl and fasting glycemia of 116 mg/dl, with a normal OGTT and normal plasma homocysteine.

On the basis of her medical records concerning the MI, we confirmed the diagnosis of coronary artery disease (CAD) according to the recently published universal definition of MI [4].

For risk stratification, we studied the patient with noninvasive diagnostic tests, including echocardiography which confirmed the presence of akinesis of the posterior basal wall with a mildly depressed systolic function (LVEF 48%) and a treadmill exercise test without any symptoms which suggest cardiac ischemia. These results from the non-invasive tests suggested no highrisk criteria for adverse outcomes for our patient. According to the guidelines by the American Heart Association/ American College of Cardiology (AHA/ACC), there was thus no indication for conventional coronary angiography.

Her coronary arteries were studied non-invasively. MSCT angiography was performed using a 64-slice computed tomography (CT) scanner, which showed no coronary lesions (Figure 1), but the presence of a hypodense area involving more than 50% of the myocardial wall of the left ventricular inferior basal portion. No lesions were detected in the wholly explored extra-coronary arterial system and then the patient was sent to follow-up with a drug regimen of perindopril 5 mg/day and hydrochlorothiazide 25 mg/ day. Aspirin, atenolol and simvastatin were discontinued. She was advised to lose weight and implement some lifestyle modifications and was asked to repeat laboratory tests for a lipid profile before the next follow-up visit. At the 6- and 12-month follow-up, the patient was free from chest pain, LDL-cholesterol was below 140 mg/dl without statin therapy and blood pressure was stable below 135/85 mmHg.

Figure 1: Coronary computed tomography angiography showing absence of flow in coronary circulation.

DISCUSSION

The overall prevalence rate of MI with normal coronary arteries is considered to be low, varying from 1% to 12%, depending on the definition of "normal" coronary arteries, which usually includes no luminal irregularities (strict definition) or arteries with some degree of stenosis (in most cases, less than 30% stenosis) [1-3]. Higher incidence rate is observed in young and female patients [4]. Studies have shown that women less than 45 years old, who have suffered acute MI, have showed normal coronary arteries angiographically in 7%

to 32% of cases [1,5,6]. We have described a case of a young female patient with a history of prior MI who, after a 10-year follow-up, continued to be asymptomatic with no high-risk profile for adverse outcomes. She was studied by MSCT angiography, which showed normal coronary arteries.

Two important issues arises in this case - the possible role of MSCT coronary angiography in risk- and prognosis assessment of patients with known or suspected CAD and - the role of long-term pharmacological therapy in patients with prior MI and normal coronary arteries.

MSCT demonstrate higher accuracy in ruling out coronary atherosclerosis non-invasively [7]. It is an attractive method for the assessment of patients with known or suspected CAD and no high-risk profile for adverse outcomes; patients for whom conventional coronary angiography is not indicated. In particular, it might have an important application in patients for whom a CAD diagnosis was made on a clinical basis with no angiographic documentation.

Our patient was approached according to a diagnostic algorithm based on the current AHA/ACC guidelines. Our patient had been asymptomatic since the MI event and had had no high-risk features for adverse outcomes in routine non-invasive tests. Medical history, clinical features and non-invasive tests did not provide specific diagnosis and prognosis, which allowed us only to continue the current medical therapy. According to the scheme provided by the current guidelines, we should have considered further imaging studies. However, in our patient, routine non-invasive imaging studies, such as nuclear stress testing or stress echocardiography would not have provided any new information for a better risk and prognosis stratification. We considered the low age and the low cardiovascular risk profile of the patient at the time of acute MI, the absence of symptoms after the event and the absence of inducible ischaemia during the treadmill exercise test and decided that a non-invasive delineation of the presence and severity of coronary atherosclerosis would allow insights for the further management of our patient.

Normal coronary arteries were shown on MSCT angiography. The high negative predictive value of MSCT coronary angiography allowed us to definitely exclude CAD and the need for further diagnostic tests. Moreover, MSCT provided a more accurate prognosis for our patient for two main reasons. First, long-term prognosis in patients with MI and normal coronary arteries is much better compared to patients with coronary occlusive disease, especially in young and female patients [2,5,8]. Patients with normal coronary arteries have a good survival rate, around 90% at 3–7 years of follow up in different studies, and a significant lower rate of reinfarction than patients with obstructive coronary disease [2,5,8]. Second, it has been demonstrated that MSCT provides independent prognostic information on baseline clinical risk factors in patients with known or suspected CAD, showing an excellent prognosis in patients with normal coronary arteries [9].

According to the AHA/ACC secondary prevention guidelines for CHD, patients who have had MI should receive indefinitely a drug regimen including an antiplatelet agent, a beta-blocker, a statin with an LDL-C goal of < 100 mg/dl or < 70 mg/dl, and an aceinhibitor with a blood pressure goal < 140/90 mmHg [10]. These guidelines raise another issue on the diagnosis of prior MI with normal coronary arteries. As stated in the paper, cases covered by these guidelines include patients with established coronary and other atherosclerotic

vascular disease. Thus, cases with prior MI and normal coronary arteries are actually not covered by these guidelines, and there are no other indications on the management of these patients in the literature.

Population of patients affected by CHD is significant and the lack of randomized clinical trials, comparing therapies for the reduction of adverse cardiac events in patients with MI and normal coronary arteries, makes their management challenging. It is difficult to find a physio-pathological rationale that allows us to transfer secondary prevention guidelines from patients with established coronary artery disease to patients with normal coronary arteries. Young patients with good prognoses, implies that a long-term multidrug therapy should be carefully considered in terms of cost-benefit analysis. Despite an undemonstrated improvement of the prognosis, a multi-drug regimen including antiplatelet agents, statins, beta-blockers and ace-inhibitors would expose our patient to well-known adverse effects and imply a considerable economic cost.

In our patient, ace-inhibitor was continued due to arterial hypertension and aspirin, statin, and beta-blocker were discontinued due to absence of coronary atherosclerotic disease, hypercholesterolemia and symptoms reflecting inducible ischaemia.

CONCLUSION

Patients with MI and normal coronary arteries constitute a large sub-population of CHD worldwide, so Large-scale randomized trials need to be conducted to determine an optimal secondary prevention strategy for these groups and MSCT coronary angiography can have an important role in the risk and prognosis assessment of patients with known or suspected CHD.

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