Angina due to microvascular dysfunction and atrioventricular conduction defects

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A 69-year-old man with a history of inferior non-ST-segment elevation myocardial infarction treated with a percutaneous coronary intervention and stenting of the right coronary artery 3 years ago presented with typical angina (Canadian Cardiovascular Society Class II) lasting for 2 weeks. Prior to this, angina attacks occurred rarely and were immediately resolved by short-acting nitrates. His regular treatment consisted of the following cardiovascular medications: aspirin 100 mg once daily, atorvastatin 20 mg once daily, perindopril 5 mg once daily, and bisoprolol 5 mg once daily. The patient’s comorbidities included hypertension, hypercholesterolaemia, and osteoarthritis.

On examination, the patient was in sinus rhythm, with a blood pressure of 138/76 mmHg and a heart rate of 68 b.p.m. His cholesterol was 165 mg/dL, low-density lipoprotein 75 mg/dL, high-density lipoprotein 41 mg/dL, triglycerides 180 mg/dL, blood glucose 102 mg/dL, creatinine 0.9 mg/dL, and estimated glomerular filtration rate 84 mL/min/1.73 m². Electrocardiography (ECG) at rest revealed a first-degree atrioventricular block without significant ST-T wave changes. Previously, the patient had no prior history of conduction system abnormalities.

Thus, at this moment, deteriorated stable angina and the first identified atrioventricular conduction defect were noted in this elderly patient.

Which tests are essential for decision-making on the continued management of the patient?

Selected diagnostic tests should be focused on specifying the level of myocardial ischaemia and disturbances of atrioventricular conduction. Taking into consideration the patient’s comorbidities, it was decided that a treadmill exercise ECG test was not indicated. Instead, a myocardial perfusion scintigraphy was performed showing ischaemia in the inferior wall in the right coronary territory. A two-dimensional echocardiogram found normal left ventricular function and hypokinesis of the basal inferior and inferoseptal segments. Importantly, 24-h ECG Holter monitoring revealed a recurrent Mobitz Type I atrioventricular block both during daytime and night-time monitoring (Figure 1). At this stage, it was decided to perform a coronary angiography, which demonstrated patency of the stent in the right coronary artery. No new lesions of the coronary arteries were detected (Figure 2).

Based on the results of the patient’s evaluation, it was decided to continue with improved conservative management.

What antianginal drugs should be preferred, taking into account the presence of conduction disorders (first- and second-degree atrioventricular block) in this patient?

Beta-blockers, as well as non-dihydropyridine calcium channel blockers, reduce atrioventricular conduction and can even cause a complete atrioventricular block and intraventricular dyssynchrony. It follows that both classes of antianginal drugs are contraindicated in this clinical setting. Thus, bisoprolol was gradually stopped. One week later, the
patient remained stable, his blood pressure was 142/80 mmHg and heart rate 74 b.p.m. Repeat continuous 24-h ECG Holter monitoring did not reveal any serious heart rhythm and conduction disturbances. To control angina, it was decided to add the dihydropyridine calcium channel blocker amlodipine 5 mg once daily and, for secondary prevention, aspirin 100 mg once daily, atorvastatin 20 mg once daily, and perindopril 5 mg once daily. In case of angina attacks, recommendations to use short-acting nitrates were also made. Long-acting nitrates were not considered because of the potential development of tolerance during their long-term use. Another argument in favour of choosing amlodipine was the need for a tighter control of blood pressure because the patient’s blood pressure increased after withdrawal of bisoprolol; however, a discussion was raised related to the underlying pathophysiology of the worsening of angina and we concluded that, in the absence of further changes in the coronary tree, the new angina was caused by coronary microvascular dysfunction. The choice of specific treatment options for microvascular angina is challenging and necessarily empirical. Besides traditional antianginal drugs, such as beta-blockers, calcium-channel blockers, and nitrates, the use of ranolazine, ivabradine, or trimetazidine has been proposed. Considering that beta-blockers are contraindicated in this clinical setting and the possibility of worsening of atrioventricular conduction with ranolazine, trimetazidine 35 mg twice daily was added to the patient’s treatment. The use of ivabradine could be an additional

![Figure 1](image1.png)  
Continuous 24-h electrocardiography Holter monitoring revealed a recurrent Mobitz Type I atrioventricular block.

![Figure 2](image2.png)  
Coronary angiography showing patency of the stent in the right coronary artery, with no new lesions of the coronary arteries being detected.
option in case the patient’s angina reoccurred and the heart rate was ≥70 b.p.m.

Three months later, the patient did not report angina attacks, his blood pressure was 130/76 mmHg and his heart rate 68 b.p.m. No atrioventricular conduction disturbances were detected during the 24-h ECG Holter monitoring. Nevertheless, a regular control of atrioventricular conduction was planned for the next visits.

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