Incomplete myocardial rupture after coronary embolism of an isolated single coronary artery

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Abstract An 82-year-old female was admitted to the coronary care unit unit with an anterior wall myocardial infarction and cardiogenic shock. She was in chronic atrial fibrillation without oral anticoagulation. Coronary angiography showed occlusion of the left main coronary artery which originated together with a normal right coronary artery from the right sinus of Valsalva. The advanced age, the presence of chronic atrial fibrillation not anticoagulated and the normal appearance of the remaining coronary arteries suggested a thromboembolic origin. Transthoracic echocardiography showed an abrupt interruption of the myocardial wall, in the apical portion of the interventricular septum, not communicating with the pericardial sac or right ventricular cavity suggesting the presence of an incomplete contained rupture of the myocardial wall at this location. She died in cardiogenic shock due to the extensive left ventricular damage.

Case report
An 82-year-old female was admitted to the coronary care unit because of sudden onset of severe chest pain lasting for 4 h. She had a past history of high blood pressure, type II diabetes and a transient ischemic cerebrovascular attack. She had been for at least seven months in atrial fibrillation without receiving oral anticoagulation. On admission, the blood pressure was 65/55 mmHg, and the heart rate was 85 bpm. Clinical examination showed intense pallor, cold extremities, elevated central venous pressure, a gallop rhythm and bilateral rales occupying more than half of the lungs. The ECG showed atrial fibrillation, ST-segment elevation in leads V2 to V6, I, aVL and ST-segment depression in leads II, III and aVF. With the diagnosis of acute anterior wall myocardial infarction and cardiogenic shock, coronary angiography was performed after hemodynamic stabilisation with...
dobutamine and dopamine infusion and insertion of an intra-aortic counterpulsation balloon (IACB).

Coronary arteriography showed the main left coronary artery and the right coronary artery originating from a single ostium in the right sinus of Valsalva. There was a complete occlusion of the anomalous left main coronary artery (Fig. 1). After the balloon dilation of the left main coronary artery, the whole left coronary artery appeared free of arteriosclerotic lesions. The right coronary artery was also normal.

Transthoracic echocardiography showed extensive akinesis of the anterior wall, apex, anterior interventricular septum, and the middle and apical segments of the lateral and inferior walls. Left ventricular ejection fraction was estimated to be 15%. In addition, there was an abrupt discontinuity, 10 mm-wide, localized at the most apical portion of the interventricular septum suggesting myocardial rupture (Figs. 2 and 3). The rupture involved the whole thickness of the myocardial wall and was contained by the epicardium and, the thickened pericardium and the right ventricle. Nonetheless, the absence of pericardial effusion or left-to-right shunt in color Doppler examination, led us to diagnose the rupture as contained and incomplete. The maximal CK value was 4034 UI/l and its MB fraction 544 UI/l, 9 h after the onset of symptoms. The patient remained in cardiogenic shock despite the percutaneous coronary intervention and the infusion of high dose intravenous inotropic drugs and the use of intra-aortic balloon counterpulsation.

Serial echocardiographic examinations showed persistence of severe systolic ventricular dysfunction. The rupture did not progress to an interventricular communication or a ventricular pseudoaneurysm. Surgery was excluded due to the cardiogenic shock and the absence of improvement of the left ventricular systolic function after reperfusion. Finally, the patient died.

Discussion

Incomplete rupture of the free myocardial wall is a rare mechanical complication after an acute myocardial infarction. The event was most likely caused by an embolic occlusion of the main left coronary artery with an anomalous origin and a common orifice with the right coronary artery.

In patients with an acute myocardial infarction treated with percutaneous coronary interventions, the incidence of free-wall myocardial rupture is 1.8% compared to 3.3% in patients treated with thrombolysis. Post-myocardial infarction rupture has a 70% mortality during hospitalisation. There are several forms of post-myocardial infarction free-wall rupture. For the diagnosis, two-dimensional echocardiography is the technique of choice, with high sensitivity and specificity. Incomplete rupture is relatively uncommon and occurs in 16.6% of the total free-wall ruptures. Cardiogenic shock is present in 58% of the patients with an incomplete myocardial rupture, most likely due to the extensive anterior wall infarction and severe pump failure.

On the other hand, a single coronary artery is a very rare anatomic anomaly, present in 0.06% of non-selected, consecutive diagnostic coronary arteriograms. There are several types of single coronary arteries, defined by the point of origin of the left and right coronary arteries, the distribution over the ventricular surface and their relationship with the great vessels (aorta and pulmonary trunk). Our case belongs to the so-called RIIA-type of the Yamanaka and Hobbs classification, modified from Lipton. In this...
classification, according to the site of origin of single coronary artery in the right or the left sinus of Valsalva, the R or the L letter is assigned. Thereafter, the Latin number I, II or III depends on the relationship between the three main epicardial vessels. Thus, in group I they emerge separately, following the normal anatomical course of either a right or a left coronary artery; in group II, they originate from the proximal part of the normally located coronary artery and, in group III, the left anterior descending artery and the circumflex coronary artery arise separately from the proximal part of the normal right coronary artery, without a common left main coronary artery. Finally, the last capital letter designates the relationship of the anomalous coronary arteries with the great vessel: whether they have a course anterior letter A, posterior letter P, between the great vessels letter B and combined letter C. The presented RIA-type accounts for 12% of the isolated coronary arteries. Reports of acute myocardial infarctions related with a single coronary artery are very uncommon, and even more when the left main coronary artery originates from the right sinus of Valsalva. Thromboembolism is the most probable cause of a coronary occlusion when it is associated with chronic atrial fibrillation without anticoagulation and the coronary angiogram does not show signs of arteriosclerotic lesions in the coronary tree.

References


