

## Case Reports

## Acute Myocardial Infarction in a Patient with Spontaneous Coronary Artery Dissection

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Spontaneous dissection of the coronary arteries comprises a particularly rare clinical entity, which may be presented as stable angina, unstable angina, acute myocardial infarction or more commonly as sudden cardiac death. It usually appears in young women and has a particularly high mortality rate, while its therapeutic management is difficult. We present a case of a 55-year-old woman with spontaneous dissection of the right coronary artery and acute myocardial infarction that was treated with angioplasty.

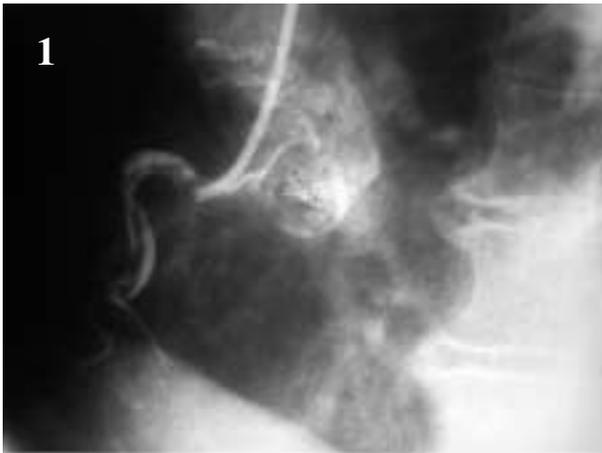
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A 55-year-old hyperlipidaemic woman, with a clear medical history was admitted to the outpatients department complaining of a two hour retrosternal pain with accompanying sweating and nausea. The physical examination revealed normal body type, 65 bpm heart rate and 130/75 mmHg arterial pressure. Cardiac tones were discrete, rhythmic, without additional sounds and the lung auscultation was normal. Peripheral pulses in the upper and lower extremities were clearly palpable. The ECG showed an inferior-lateral myocardial infarction without involvement of the right ventricle (ST segment elevation in leads II, III, avF, V<sub>5</sub>, V<sub>6</sub> with accompanying depression in leads V<sub>1</sub>-V<sub>3</sub>). Although the patient was thrombolysed with rateplase neither the pain remitted, nor the elevations decreased. On the contrary, there was deterioration in the patients' haemodynamic condition and a new ECG showed ST segment elevation in the right precordial leads (RV<sub>4</sub>-RV<sub>5</sub>). The cardiac echocardiogram revealed a normal aortic root and ascending aorta, hypokinesia in the basal and

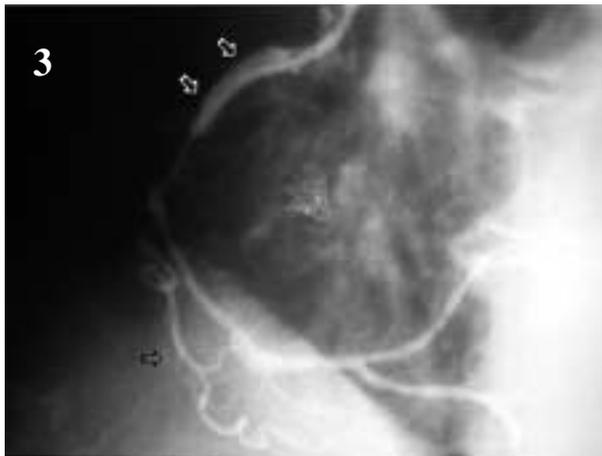
middle inferior wall of the left ventricle and hypokinesia of the right ventricle without any significant valvulopathy or pericardial fluid. Based on the above, the patient was transferred to the Haemodynamic Laboratory in order to undergo coronary angiography. The coronary angiography revealed a normal left coronary artery with no atheromatic lesions, while the right coronary artery showed dissection along its entire length. Angioplasty was immediately performed in the right coronary artery and 3 stents were sequentially placed, with complete restoration of blood flow (Figures 1-5). After the completion of the angioplasty, the patient's arterial pressure was restored with complete recession of the pain and the ECG elevations. The patient's course during hospitalization was complication-free. A mild increase of myocardial enzymes (CKMB up to 52 mg/dl), typical for myocardial infarction, was observed, while the laboratory tests for possible immunological disease, were negative. Ten days after admission, the patient was discharged from the hospital in a good clinical con-



**Figure 1.** Left anterior oblique projection of the right coronary artery. The dissection of the endothelium is obvious in the entire length of the vessel.



**Figure 2.** Right anterior oblique projection of the right coronary artery. The guide wires have been placed in the vessel (white arrow) and in a branch for the right ventricle (black arrow).



**Figure 3.** Left anterior oblique projection of the right coronary artery. The blood flow in the right coronary artery is restored after stenting in the first third (white arrows). The stent was placed via a guide wire which had been placed in the branch for the right ventricle (black arrow).



**Figures 4 and 5.** Left and right anterior oblique projection of the right coronary artery, respectively. After the placement of stents (white arrows) the lumen of the vessel is completely restored.

dition on a pharmacological regimen of beta blocker, aspirin, clopidogrel and statin. The patient, 13 months after angioplasty, remains asymptomatic.

## Discussion

Acute spontaneous dissection of a coronary artery is more common in women (3:1), 25% of cases are observed during pregnancy or postpartum and mainly involve the left coronary artery (87%). On the contrary in men, acute spontaneous dissection mainly involves the right coronary artery (67%). Mortality is extremely high and reaches 70% in all cases, while the dissection is often diagnosed postmortem from autopsy findings<sup>1,2</sup>.

The cause of spontaneous dissection is unknown. Most patients are young, without predisposing risk factors for coronary artery disease. There is a correlation with pregnancy and puerperium and the hormonal and haemodynamic changes which take place during pregnancy and cause weakening of the blood vessels media, through morphological changes in the connective tissue collagen<sup>3-5</sup> afford a possible explanation.

There is also a correlation with immunological diseases like lupus erythematosus, with collagen diseases including Marfan's and Ehler Danlos syndrome (especially type IV), Kawasaki disease as well as with the administration of contraceptive medication<sup>6</sup>. The report of acute spontaneous dissection of the coronary artery after cocaine use is noteworthy, as it adds this complication to the long list of cardiovascular complications of cocaine abuse<sup>7</sup>. Finally, acute spontaneous dissection of coronary artery has been associated with intense physical exercise<sup>8</sup>.

A special class of spontaneous coronary artery dissection is that which develops on preexisting atheromatosis. In these cases, the dissection is the result of spontaneous rupture of the atheromatous plaque for unknown reasons, as has been shown by studies with intracoronary ultrasound (IVUS). It has been postulated that the patients with dissections of atheromatous origin have a much better prognosis, due to the better collateral circulation that has already been developed<sup>9-11</sup>.

The histological findings from postmortem studies are particularly interesting. Diffused inflammatory infiltration of the tunica adventitia of the blood vessel in 25-40% of cases, which consists mainly of eosinophils, as well as cystic necrosis of the tunica media of the vessel in 25-30% of cases was observed.

This kind of inflammatory reaction is thought to possibly cause the dissection via a proteolytic reaction by proteases released by eosinophils. However, it is most probable that this "inflammation" is the result and not the cause of the dissection<sup>12,13</sup>. Also, based on certain histological preparations from coronary arteries with spontaneous dissection, angiomas of the tunica adventitia was identified and based thereupon, it has been postulated that in certain patients the vasa vasorum of the coronary arteries are particularly vulnerable and prone to spontaneous haemorrhage, thus becoming the first locus of haemorrhage in the tunica media, resulting in an intramural haematoma and dissection<sup>14</sup>.

The clinical presentation of the spontaneous dissection of the coronary arteries includes the entire spectrum of coronary artery syndromes. The severity of the clinical manifestations depends on the artery, the position and the extent of the dissection. Thus, it may present as stable or unstable angina, as acute myocardial infarction - as in the case of our patient - and as sudden cardiovascular death, which is the most common.

Treatment for patients with spontaneous dissection of coronary artery includes pharmaceutical treatment and invasive methods, eg coronary bypass surgery and coronary angioplasty with stent. Due to the limited number of cases that have been reported in the international literature, there are no studies comparing the effectiveness of the various methods, nor clear guidelines for the therapeutic approach of these patients.

Vasodilating drugs, including nitrates and calcium channel blocking agents, have a number of indisputable benefits. These medications decrease the spasms in the dissected coronary artery and thus probably protect the vessel from further extension of the dissection, until the invasive intervention.

The role of thrombolytic treatment is uncertain. Several authors believe that thrombolysis is beneficial, since it helps in the dissolving of the blood clot, which has formed in the false lumen of the vessel, thus restoring blood flow in the true lumen of the vessel. However, according to other authors, it is possible that thrombolysis might aggravate haemorrhage, thus further extending the dissection of the vessel<sup>15-16</sup>. In our case, the thrombolysis that was administered was considerably detrimental, since it not only effected a deterioration in the symptoms, but the patient was haemodynamically burdened and seemed to result in the infarction extending to the right ventricle.

Coronary bypass is the therapeutic intervention of choice in dissections which include the left main coronary artery or more than one vessels. However, in many cases this may prove very difficult technically, since often the dissection extends further than shown on the angiogram and the placing of the graft in the diseased artery is particularly difficult<sup>9</sup>.

Angioplasty with stenting is a good therapeutic choice, especially in localized and not extended dissections. In many cases where the patients are young, it is the treatment of choice, considering the technical difficulties that often appear in coronary bypass<sup>17,18</sup>. In the case of our patient, despite the fact that the dissection in the right coronary artery was particularly extended, the treatment involving multiple stent placements in a row was particularly successful, both angiographically and clinically speaking. Thus, to the controversial "angioplasty or bypass" dilemma, we must reply that treatment should be individualized depending on the localization and the extent of the dissection, as well as on the individual patient characteristics.

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