

Dual Anterior Descending Coronary Artery Associated with Coronary Artery Disease

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The patient is a male with risk factors for coronary artery disease, who was referred for cardiac catheterization after acute myocardial infarction in the inferior wall. The patient underwent transluminal coronary angioplasty in the right coronary artery with successful stent implantation.

Anomalies of the anterior descending coronary artery are angiographic findings usually associated with congenital heart diseases, such as tetralogy of Fallot and transposition of great vessels¹.

The origin of the anterior descending coronary artery in the right sinus of Valsalva or in the right coronary artery is a rare anomaly with an incidence ranging from 0.03% to 0.2% of the patients undergoing routine catheterization².

A dual anterior descending coronary artery is an exceptionally rare entity, and only 6 cases have been reported in the literature³⁻⁷.

We report the case of a dual anterior descending coronary artery associated with the presence of coronary artery disease.

Case Report

The patient is a 50-year-old white male referred to undergo cardiac catheterization, because of an acute myocardial infarction in the inferior wall occurring 12 days earlier. The patient had been treated in a conservative way in his city of origin.

The following risk factors for coronary artery disease were found: systemic arterial hypertension, dyslipidemia, non insulin-dependent diabetes mellitus, and positive morbid familial history of coronary artery disease.

On hospital admission, the patient was asymptomatic. On physical examination, he was in good general condition, his blood pressure was normal, as were his cardiac and pulmonary auscultations. At the time of admission, his chest radiogram was normal, and the electrocardiogram showed an electrically inactive zone in the inferior wall.

Cardiac catheterization was performed according to the Judkins technique and showed the following: a dominant right coronary artery with an eccentric 90% lesion and a thrombus in its initial third, and an anterior descending coronary artery partially originating from the right coronary artery and partially from the trunk of the left coronary artery (fig. 1).

The anterior descending branch originating from the left coronary artery split after a short trajectory into a septal and a diagonal branch (fig. 2).

The portion of the anterior descending branch originating from the right coronary artery had an anomalous trajectory, passing in front of the pulmonary artery towards the anterior interventricular sulcus. From then on, the anatomic trajectory of the anterior descending branch continued, which was interrupted after the first diagonal branch from the left coronary trunk (fig. 3). Neither the anterior descending branch originating from the left coronary trunk nor the one originating from the right coronary artery had atherosclerotic lesions. No lesions were observed in the left coronary trunk or in the circumflex branch.

The left ventricular contraction was normal.

Right coronary angioplasty was proposed to the patient and was uneventfully performed, with successful primary stent implantation (figs. 4 and 5).

The patient had a good in-hospital evolution and was discharged from the hospital on the second day of hospitalization.

Discussion

Coronary arteries of anomalous origin are found in 1% to 2% of the population undergoing cardiac catheterization³.

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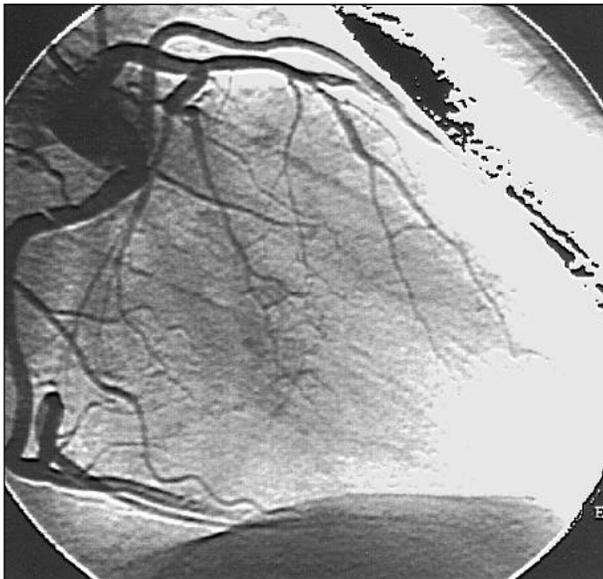


Fig. 1 – Right coronary artery with an eccentric 90% lesion in its initial third.

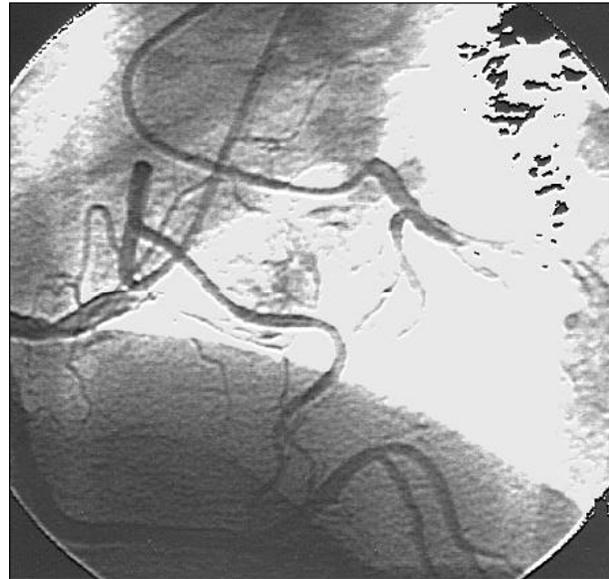


Fig. 3 – Anterior descending coronary artery originating from the left coronary artery and dividing after a short trajectory into a septal and a diagonal branch.

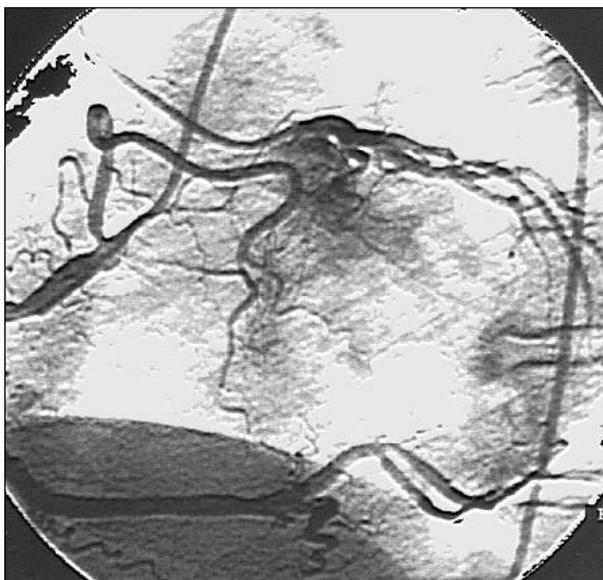


Fig. 2 – Left anterior descending coronary artery partially originating from the right coronary artery with an anomalous trajectory and passing in front of the pulmonary artery towards the anterior interventricular sulcus.

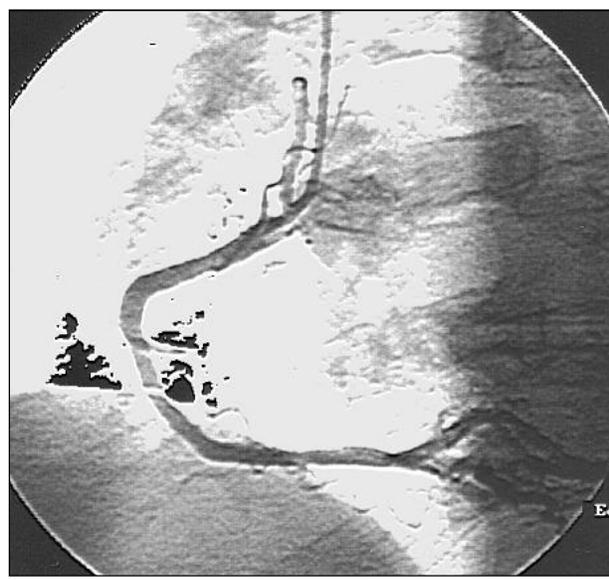


Fig. 4 – Right coronary angioplasty with stent implantation.

The most common is the origin of the circumflex artery from the right sinus of Valsalva or from the right coronary artery⁴. Traditionally, these anomalies are classified into the 6 subgroups shown in table I².

Classically, no clinical consequences were attributed to those findings because the blood flow in the anomalous coronary artery is usually normal.

Anomalies associated with changes in blood flow may result in sudden death, myocardial ischemia, and acute myocardial infarction. Some of those anomalies are as follows: coronary artery fistulas, origin of the left coronary artery from the pulmonary artery or from the right

sinus of Valsalva, and congenital coronary artery atresia or stenosis^{2,8,9}.

In human hearts, the anterior descending branch is the vessel with the most constant origin, course, and distribution⁵. In the case of an anomalous origin of the anterior descending branch from the right sinus of Valsalva or from the right coronary artery, its trajectory may have 2 variants: to pass between the aorta and the pulmonary artery, or to be anterior to the pulmonary trunk before reaching the anterior interventricular sulcus².

In the case of a dual anterior descending coronary artery, 2 branches provide the usual distribution of that coronary artery as follows: 1) one branch, the short anterior descending branch, ends at the beginning of the anterior



Fig. 5 – Primary success of right coronary angioplasty.

interventricular sulcus; 2) a second longer branch has a variable course beside the anterior interventricular sulcus and returns to this sulcus distally⁴.

This anomaly was classified into 4 types by Spindola-Franco et al¹⁰. In types I, II, and III, the anterior descending branch originates from the trunk of the major anterior descending coronary artery (the anterior descending coronary artery itself). The case reported fits type IV dual anterior descending coronary artery, which is a rare anomaly. In this type, the long anterior descending branch originates in the right sinus of Valsalva or in the right coronary artery.

The clinical influence of this anomaly is still controversial in the literature. It was initially considered benign²; however, some authors associate it with stable angina, acute myocardial infarction, and postinfarction angina. Mello et al⁶ reported 2 cases with clinical, electric, and scintigraphic evidence of myocardial ischemia, in which the anterior descending branch originated from the right sinus of Valsalva.

| Table I – Coronary artery anomalies |
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| <p>I – Anomalous origin from the aorta</p> <p>A - High aortic origin;</p> <p>B - Origin from the sinus of Valsalva or from the contralateral coronary artery:</p> <ol style="list-style-type: none"> 1. Circumflex artery originating from the right sinus of Valsalva or from the right coronary artery 2. Left anterior descending artery originating from the right sinus of Valsalva or from the right coronary artery 3. Left coronary artery originating from the right sinus of Valsalva 4. Right coronary artery originating from the left sinus of Valsalva <p>C - Single coronary artery</p> <p>II - Anomalous origin from the pulmonary artery</p> <p>III - Coronary arteriovenous fistula</p> <p>IV - Coronary artery atresia or hypoplasia</p> <p>V - Coronary artery aneurysm</p> <p>VI - Variations in patients with congenital heart disease:</p> <p>A - Tetralogy of Fallot</p> <p>B - Transposition of the great arteries</p> <p>C - Pulmonary atresia with intact interventricular septum</p> <p>D - Univentricular heart with tricuspid atresia</p> <p>E - Congenitally corrected transposition of the great arteries</p> <p>F - Truncus arteriosus</p> <p>G - Right ventricular double outflow tract</p> <p>H - Bicuspid aortic valve</p> <p>I - Supravalvular aortic stenosis and coarctation of the aorta</p> <p>J - Supravalvular mitral stenosis</p> <p>K - Situs inversus</p> |
| Source: (2). |

Oliveira et al¹ reported that the right side origin of the anterior descending branch is a significant anomaly that may cause myocardial ischemia. Coyle et al⁷ correlated the origin of the anterior descending branch in the right sinus of Valsalva or in the right coronary artery with acute myocardial infarction and postinfarction angina.

In the literature reviewed, only 2 cases of a dual left anterior descending coronary artery associated with obstructive coronary disease were found³, ours being the third case reported.

Therefore, anomaly of the anterior descending coronary artery may be considered as a hypothesis in the differential diagnosis of angina and ischemia of the anterior wall.

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