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Atherosclerosis in Type IV Dual Left Anterior Descending Artery and Anomalous Aortic Origin of the Left Circumflex Artery in Association with Rheumatic Valve Disease: A Case Report

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ABSTRACT

Double left anterior descending coronary artery arising from the left and right coronary arteries is a very rare congenital coronary artery anomaly. In this case, there was also a circumflex artery arising from the right sinus Valsalva and in association with severe rheumatic valve disease. Subsequently, the patient underwent mechanical aortic valve replacement with a 21-mm bileaflet mechanical aortic valve and coronary artery bypass grafting. We performed coronary artery bypass grafting of 3 vessels, including the left internal mammary artery to the large diagonal branch and the saphenous vein graft to the circumflex artery and the right coronary artery, under cardiopulmonary bypass. In this report, we describe an unusual case of this combination in association with both atherosclerosis and rheumatic aortic and mitral valve disease.

INTRODUCTION

Coronary artery anomalies are uncommon and the majority are diagnosed incidentally, but identification of these anomalies is important because of the possible clinical consequences. Anomalous aortic origin of the coronary artery and dual left anterior descending artery (LAD) are both rare coronary anomalies. The combination of these 2 anomalies is a very rare variant, and only a few similar cases of this combination have been documented [Chang 1997; Tutar 1999]. We report an unusual case of this combination in association with both atherosclerosis and rheumatic aortic and mitral valve disease. To our knowledge, such a combination has not been previously reported.

CASE REPORT

A 62-year-old, normotensive, diabetic male presented with progressive exertional dyspnea and syncope. He had been complaining of exertional dyspnea for about 7 years and he had experienced syncope 4 times. The first syncope had been about 2 years previously and the last 3 had occurred in the previous 2 months. He had a history of smoking 40 packs of cigarettes a year and a positive family history for coronary heart disease. His lipid profile demonstrated only mild disturbances. The physical examination revealed a systolic ejection murmur of moderate intensity at aortic area radiating to the neck and also a milder holosystolic murmur at the apex. His electrocardiogram was normal except for nearly 0.5 millimeters of ST segment depression in leads V5 and V6. Transthoracic echocardiogram revealed severe aortic regurgitation and a moderate degree of aortic stenosis with maximal and mean transvalvular gradients of 57 and 32 mmHg, respectively. Aortic cusps were rather thickened and severely calcified. There was also a mitral regurgitation of moderate severity and a mild degree of stenosis with maximal and mean transvalvular gradients of 10 and 4 mmHg, respectively. Left ventricular systolic function was normal. Before valve surgery, left heart catheterization was performed. Selective left coronary angiography with a JL 4 catheter revealed a short LAD (LAD proper) that terminated at the proximal anterior interventricular sulcus after bifurcating into the first septal and a large diagonal branch coursing over the anterolateral wall. (Figure 1). The left circumflex artery (LCX) could not be seen. Selective right coronary angiography with a JR 4 catheter revealed the right coronary artery (RCA) and 2 faintly opacified arteries originating from the same ostium in the right sinus of Valsalva. With a slight clockwise rotation, it was possible to visualize these 2 vessels, too. One vessel passed retroaortically toward the left and followed the normal course of the LCX. The other vessel had a course anterior to the conus toward the left side and then turned down to descend into the mid and distal anterior interventricular sulcus and reached the apex (Figure 2). The mid diagonal artery and distal LCX demonstrated 90% stenosis, and there was a 70% stenosis in the distal RCA. Subsequently, the patient underwent mechanical aortic valve replacement with a 21-mm bileaflet ATS mechanical

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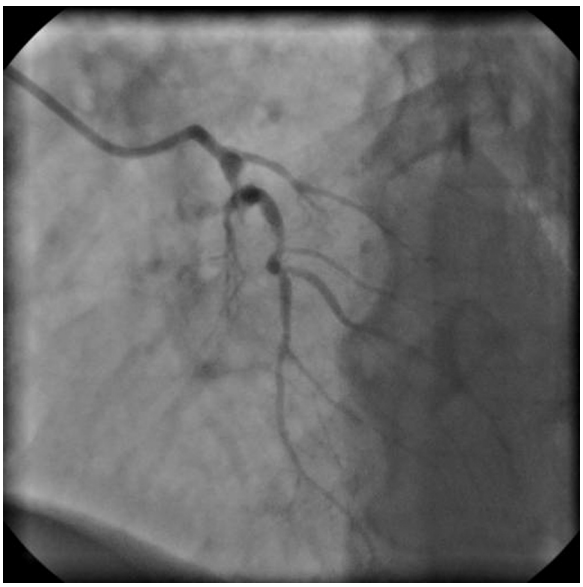

Figure 1. The short left anterior descending artery (LAD proper) that terminated at the proximal anterior interventricular sulcus after bifurcating into the first septal and a large diagonal branch coursing over anterolateral wall.

Figure 2. Right coronary artery, left circumflex artery, and left anterior descending artery originating from the same ostium in the right coronary sinus of Valsalva.

aortic valve (ATS Medical, Minneapolis, MN, USA) and coronary artery bypass grafting (CABG). We performed CABG of 3 vessels, including the LIMA to the large diagonal branch and the saphenous vein graft to the circumflex artery and the RCA, under cardiopulmonary bypass. The patient did well clinically and was discharged from the hospital on postoperative day 10.

DISCUSSION

Anomalous origin of the LCX from the RCA or right sinus of Valsalva is probably the most frequent coronary anomaly [Mikaeloff 1979; Chang 1997; Tutar 1999]. Under normal circumstances, this anomaly does not have any significant clinical consequences, but may increase the risk in mitral and aortic valve replacements because of the possibility of an accidental vascular compression during surgery [Mikaeloff 1979]. Informing the cardiac surgeon of the anomalous LCX artery before surgery may be life saving.

Whether some anomalies such as ectopic origin of the LCX predispose to obstructive atherosclerotic coronary disease or not has been controversial. But the prevailing opinion is that coronary segments with an anomalous course are not more susceptible to atherosclerosis than normal segments in the same individual [Angelini 2002]. Spindola-Franco et al classified dual LAD into 4 types [Spindola-Franco 1983]. Type IV was described as the presence of 2 LADs: a long LAD originating anomalously from the right sinus of Valsalva and a short LAD proper originating normally and terminating in the proximal anterior interventricular sulcus after giving off septal and diagonal branches. This anomaly is known not to be associated with unfavorable events in the absence of coronary atherosclerosis, but as it may lead to misinterpretation of angiograms, identification of it is important.

Aside from bicuspid aortic valves, association of coronary anomalies with rheumatic valve disease has also been previously reported [Tejada 2001]. But to the best of our knowledge, our report appears to be the first of this rare variant of coronary anomalies associated with both severe coronary atherosclerosis and rheumatic valve disease and necessitating both CABG and aortic valve replacement.

CONCLUSION

Even though this variant was not associated with ischemia or any hemodynamic impairment in the absence of atherosclerosis, the importance of this variant cannot be underestimated, as it may lead to a misinterpretation of the coronary angiography. Mapping of the perfusion of all myocardial segments supplied by the arteries visualized and searching for the lacking artery during angiography is important. Otherwise, we may cause an incomplete revascularization in the presence of atherosclerosis or we may make a life-threatening mistake during a valve surgery such as accidental compression of a nondiagnosed coronary artery originating and coursing abnormally. Both cardiologists and cardiovascular surgeons should be aware of the possibility of these rare but sometimes very important anomalies.

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