

Anomalous Origin of Right Coronary Artery from the Left Anterior Descending Artery

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Abstract

Anomalous origin of right coronary artery from the left anterior descending artery is an extremely rare coronary anomaly. We report the case of a 57-year-old patient presented with effort angina. Coronary angiography revealed that an anomalous RCA originated from the middle LAD. The anomalous RCA had also critical ostial stenosis and LAD had some meaningless lesions in the proximal and mid segments. Computed tomographic angiography confirmed anomalous RCA originating from the middle portion of LAD and coursing anterior of the pulmonary artery to the right atrioventricular groove. We proposed medical management for this patient.

The anomalous origin of the RCA as a branch of the LAD artery is a very rare variation of single coronary artery. It is usually asymptomatic and fortuitous discovery but can be associated with a risk of myocardial ischemia and sudden cardiac death especially if the anomalous artery had an inter-arterial course. Computed tomographic angiography is an important non-invasive diagnostic tool for establishing the course of the vessel and may be adjunct to angiography. Treatment of coronary anomalies is still controversial; it may be medical, surgical or percutaneous.

Keywords: Coronary artery anomaly; Coronary angiography; Computed tomographic angiography; Coronary heart disease

Introduction

The anomalous origin of the RCA as a branch of the LAD artery is a very rare variation of single coronary artery. It is usually asymptomatic and fortuitous discovery but can be associated with a risk of myocardial ischemia and sudden cardiac death especially if the anomalous artery had an inter-arterial course.

Case Report

A 57-year-old female with a history of obesity, hypercholesterolemia, systemic hypertension and paroxysmal atrial fibrillation presented with effort angina for one month ago. Physical examination and electrocardiogram were normal, but the stress test was clinically and electrically positive.

Coronary angiography was performed; only a solitary ostium could be catheterized, giving off branches to the LMCA, LAD and LCX. The RCA derived from the mid segment of the LAD at the same level as the origin of the first diagonal branch (Figure 1). Non-selective coronary angiography revealed absence of right coronary artery from the right coronary sinus (Figure 2).

There were some meaningless lesions in the proximal and mid segments of the LAD, and 70% obstruction involving the ostium of the anomalous. Computed tomographic angiography also confirmed anomalous RCA originating from the middle portion of LAD after the first septal perforator and coursing anterior to the pulmonary artery to the right atrioventricular groove (Figure 3).

We proposed medical management for our patient, comprising beta-blockers, angiotensin-converting enzyme inhibitors, nitro derivative and aspirin. She was free of chest pain at a 6-month follow-up examination.



Figure 1: Coronary angiography: only a solitary ostium is catheterized, giving off branches to the LMCA, LAD and LCX. The RCA derived from the mid segment of the LAD.

Discussion

In the largest series of coronary angiography until to date [1] (126 595 patients), incidences of coronary artery abnormalities other than

fistulas, anomalous RCA and single coronary artery have been reported as 1.15, 0.26 and 0.04%. The anomalous origin of the RCA arising from the LAD, a subgroup of single coronary artery, is extremely rare and was found in 1 of 70 850 patients (0.0014%) undergoing coronary angiography in a recent Turkish publication [2].



Figure 2: Non-selective coronary angiography: absence of right coronary artery from the right coronary sinus.



Figure 3: Computed tomography coronary angiograph: volume rendering (a) and curved (b,c) reconstruction: Anomalous origin of right coronary artery from the left anterior descending artery.

In this series, single coronary artery was found in 10 cases (0.014%). In a recent Tunisian series of 7330 coronary angiographies [3], this anomalous RCA originating from the LAD was also noted in 1 case (0.014%). This diversity of values may be explained by genetics and geography and may reflect the inevitable nature and bias of studies.

According to the literature review of Wilson et al. [4], there have been at least 36 published reports of an anomalous RCA arising from the LAD. In this study, most of the cases have been in structurally normal hearts, the majority of anomalous RCA have their origin in the mid LAD segment and the anomalous artery almost always arises as single discrete vessel and its course is almost universally anterior to the right ventricular outflow tract, as in our case [5,6].

The anomalous coronary artery may run in front of the main pulmonary artery, posterior to the aortic trunk or between the aorta and main pulmonary artery. Although the inter arterial subtype, which is also called malignant, is known to be associated with a high risk of myocardial ischemia and sudden cardiac death, the other subtypes are rarely associated with these complications [1,7].

Atherosclerotic disease does not appear to be increased in patients with anomalous coronary arteries; in particular, the anomalous vessel does not appear to be predisposed to develop atherosclerosis and most anomalous coronary arteries are asymptomatic and are seen as incidental findings on coronary angiography [3,8].

Despite angiography is still the gold standard for diagnosis and evaluation of the anomalous arteries, computed tomographic angiography may also be an important adjunctive non-invasive diagnostic tool for establishing the course of the vessel, especially to indicate whether it passes between the aortic and pulmonary trunks [2,7].

The management of coronary anomalies is still with no consensus and controversial: medical treatment is generally proposed in asymptomatic patients, with no malignant subtype and in the absence of associated severe coronary artery disease and/or overt ischemia; and surgical treatment is generally proposed in the other cases [2,3]. Percutaneous coronary intervention may be an alternative treatment choice to surgery, especially in patients with high surgical risk and complex coronary anatomy [4,8].

In the present study, given the difficulty in assessing risk, the lack of consensus on the management of anomalous coronary arteries and the lack of long-term outcome data for surgical management, we proposed medical management for our patient, comprising beta-blockers, angiotensin-converting enzyme inhibitors, nitro derivative and aspirin.

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