Anomalous origin of right coronary artery: Is there a link between coronary artery variation and myocardial ischemia?

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Abstract

A 56-year-old male was admitted to our hospital for evaluation of angina pectoris. He had a history of non Q myocardial infarction and a family history of sudden cardiac death. The resting electrocardiogram demonstrated incomplete right bundle branch block and T wave inversion in the inferior leads. Transthoracic echocardiography revealed no wall motion abnormalities with a normal ejection fraction. Stress echocardiogram showed reversible filling defect in inferior wall. The aortogram, during coronary angiography, revealed an anomalous high origin of the right coronary artery, just below the sino-tubular junction.

INTRODUCTION

Coronary artery anomalies usually cause atypical symptoms. Therefore they are considered to be incidental finding during 1.3% of conventional coronary angiography [1]. However, an association between the anomalous aortic origin of coronary arteries and fatal cardiac events has been reported [2,3,4] A case of anomalous origin of right coronary artery related with myocardial ischemia is described below and possible diagnostic dilemmas are being discussed.

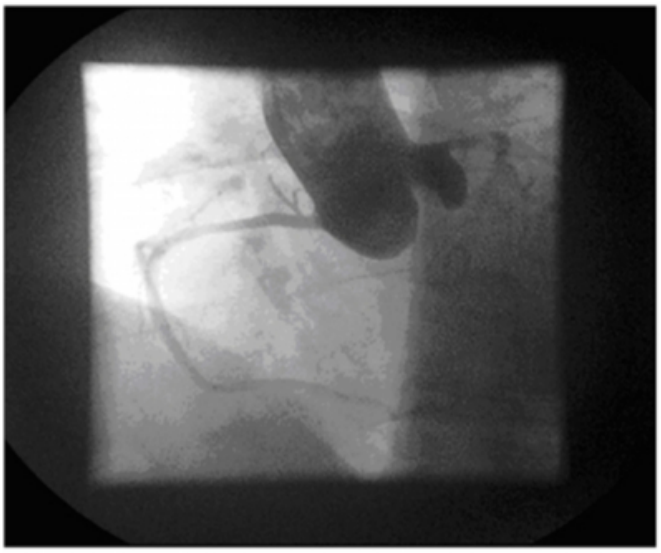
CASE REPORT

A 56 year-old male with a history of non Q myocardial infarction and family history of sudden cardiac death presented in the emergency department complaining of new onset of resting angina lasting between 15-20 minutes. Physical examination was normal. Cardiac auscultation revealed no murmurs or gallop rhythm. Chest radiograph showed no abnormality. Resting electrocardiogram demonstrated incomplete right bundle branch block and T wave inversion in inferior leads. Laboratory findings including CK, CK-MB and TnT were found between normal range in repetitive measurements.

Transthoracic echocardiography revealed no wall motion abnormalities with a normal ejection fraction. Stress echocardiogram exhibited a reversible inferior perfusion defect. Coronary angiography was performed using the Judkins procedure from the right femoral artery. Aortography obtained in a left anterior oblique view revealed the absence of a right coronary ostium in the right sinus of Valsalva. The left coronary ostium was located normally in the left sinus of Valsalva. Selective left coronary arteriography displayed normal courses of the left main, left circumflex, and the left anterior descending arteries. The anomalous right coronary artery (RCA) was visualized, originating from a higher position than the normal in the right sinus of Valsalva. There were no obstructive lesions (Fig,).

Figure 1

Figure 1: Coronary angiography. The orifice of the right coronary artery highly positioned.



DISCUSSION

Anomalous origin of coronary arteries has been reported as the cause of angina pectoris, arrhythmia, syncope and fatal myocardial infarction [2-4]. Its incidence ranges from 0.61% to 1.3% [1,2,3,4,5] . A rare anomaly is left coronary artery running between the aorta and pulmonary trunk, which is often clinically presented as sudden cardiac death. This type of abnormal running was also demonstrated in 25% of the anomaly of the RCA from the left sinus of Valsalva [6]. These anomalies are frequently associated with other congenital heart diseases, including bicuspid aortic valve, mitral valve prolapse, and ventricular septal defect [5].

The incidence of anomalous origin of the right coronary artery (RCA) out of the right sinus of Valsalva ranges from under 0.01–0.09% [7].The usually described variance is RCA arising from the wrong sinus of Valsalva. Rarely there is a fistula draining into one of the cardiac cavities or a displaced connection, as seen in anomalous origin of coronary artery from the pulmonary artery, resulting in a left-to-right shunt.

The exact mechanism, associated to cardiac events, is unclear in cases of coronary artery with anomalous origin and no obvious obstructive lesion. It might be related to mechanical compression of the anomalous coronary artery between the aorta and pulmonary root or great vessels, especially during exercise [1,6] In a recently described case, RCA was originating at an acute angle from the ascending aorta and its proximal segment was incorporated in the wall of the aorta [8]

In the present case, the orifice of the RCA was highly positioned (so-called high take-off) and considered to be the possible mechanism for the myocardial ischemia seen in our patient, as an adequate mass of blood stored in the cusp, could not be used effectively.

There is a great controversy concerning the benign or life threatening character of the above mentioned anomaly. High take-off of the RCA ostium or an interarterial course should be considered a risk factor for myocardial ischemia under certain conditions [9, 10]. An autopsy examination has revealed high take-off of the right coronary artery with acute downward angulation of the proximal right coronary artery and acute downward angulation of the left main coronary artery, leading to sudden death [11]. Incidentally, it can also be found in relation with other congenital cardiac abnormalities such bileaflet aortic valve. Surgical repair of the coronary anomaly may be considered as the best way to prevent a future fatal cardiac event.

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