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Case Report

Ectopic Origin of the Right Coronary Artery Shown on Cardiac Computed Tomography

Youg-Chien Huang[1], Chin-Ming Jeng[1], Tzu-Chieh Cheng[1,2]*

[1]*Department of Radiology, Cathay General Hospital, Taipei, Taiwan*
[2]*Institute of Aboriginal Health, Tzu Chi University, Hualien, Taiwan*

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Abstract

Coronary artery anomalies can be life-threatening, with a prevalence of approximately 1%. An ectopic origin of the right coronary artery (RCA) from the left sinus of Valsalva accounts for less than 1% of all coronary artery anomalies. Although conventional angiography plays a standard role in diagnosis, recent advances in computed tomography (CT) are more accurate for three-dimensional structures. We report a CT-confirmed symptomatic case of an ectopic origin of the RCA from the left sinus of Valsalva. (*Tzu Chi Med J* 2008;20(1):67–69)

*Corresponding author. Department of Radiology, Cathay General Hospital, 280, Section 4, Jen-Ai Road, Taipei, Taiwan.
E-mail address: tcuarnium@yahoo.com.tw

1. Introduction

Coronary artery anomalies can be life-threatening and are usually incidental findings during conventional coronary angiography (1–5). The prevalence of coronary artery anomalies is approximately 0.3–1.2% (1,2,6,7). An ectopic origin of the right coronary artery (RCA) from the left sinus of Valsalva is uncommon, comprising less than 1% of all coronary artery anomalies (6,8). Thus, we report a case of an ectopic origin of the RCA from the left sinus of Valsalva at our institution.

2. Case report

A 26-year-old woman was referred to our cardiology unit because of recurrent episodes of chest pain during physical activity, followed by syncope on one occasion. She had experienced chest pain of 30 minutes' duration, which radiated to the jaw and back, diaphoresis and dyspnea during exercise since her school days. Her physical examination was normal and several electrocardiograms showed normal sinus rhythm. Further, a stress electrocardiogram and echocardiogram were negative. Her family and social histories were unremarkable.

She refused cardiac catheterization because of its invasiveness. Further cardiac evaluation by single photon emission computed tomography showed mild reversible ischemic change of the basal inferior wall. Cardiac computed tomography (CT) showed an abnormal origin of the RCA from the left sinus of Valsalva. Her RCA passed between the pulmonary artery and aorta into its normal territory (Fig. 1).

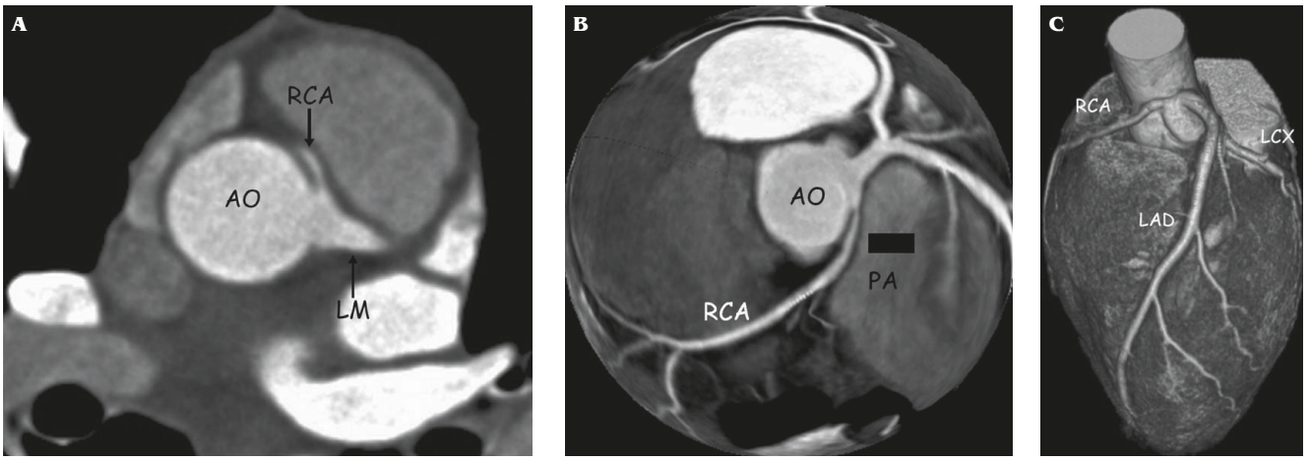

Fig. 1 — (A) Contrast-enhanced axial computed tomography (CT) shows the right coronary artery (RCA) and left main trunk (LM) arising from the left sinus of Valsalva. AO = aorta. (B) Contrast-enhanced oblique CT shows the RCA coursing between the AO and pulmonary artery (PA). (C) Reconstructed CT with volume-rendering technique shows the three-dimensional structure of the RCA, left ascending artery (LAD) and left circumflex artery (LCX) originating from the left sinus of Valsalva.

3. Discussion

Conventional coronary catheter angiography is the standard procedure for the assessment of coronary artery disease but has some limitations [1,3,9]. Conventional angiography is an invasive and expensive technique. Searching for an anomalous orifice and interpretation of vessel anatomy may be difficult when using conventional angiography. Moreover, it only selectively visualizes one vessel tree at a time, and requires a relatively high dose of ionizing radiation and iodinated contrast material [1,3,4,7–10].

Identification of coronary anatomy anomalies is important because they can cause complications such as myocardial ischemia and sudden cardiac death [1,11]. Conventional angiography does not provide any in-depth information and is thus unable to provide the exact three-dimensional course of the anomalous coronary artery [1,2,10,12]. Novel advances in CT provide a noninvasive technique, and offer an accurate diagnostic modality to visualize the origin and course of abnormal coronary arteries by a three-dimensional display of anatomy [1,3,4,7–10,12,13].

One limitation of CT is the lack of hemodynamic information. Although CT provides insight into the anatomy of an aberrant artery and its surrounding structures, assessing the cause of ischemia in affected patients remains difficult and various artifacts can degrade the image quality [1,9,13]. In addition, patients with arrhythmia who are unable to hold their breath cannot be examined [1,12].

Approximately 20% of coronary artery anomalies have clinical consequences such as myocardial ischemia or infarction [12]. The recognition of coronary anomalies in patients is important during coronary arteriography, coronary interventions and cardiac surgery. Some specific anomalies in the origin and course of coronary arteries have been recognized as leading causes of sudden cardiac death, particularly in military recruits and young athletes [1,7,11,14].

The most common coronary artery anomaly is origin of the left circumflex artery from the RCA or right coronary sinus, with a prevalence of approximately 0.7%. The next most common anomaly is separate origins of the left circumflex artery and left ascending artery from the left sinus of Valsalva, with a prevalence of approximately 0.2% [7].

A normal RCA arises from the right coronary sinus and runs towards the right posterior to the pulmonary outflow tract, and then runs inferiorly into the right atrioventricular groove toward the posterior interventricular septum [1]. An ectopic origin of the RCA from the left sinus of Valsalva is uncommon, comprising less than 1% of all congenital coronary anomalies. It can cause syncope, myocardial infarction and sudden death in the absence of a critical fixed stenosis, and can increase the mortality rate by 25% [6,8].

There are three ectopic origin subtypes of the RCA from the left coronary sinus based on the path of the anomalous artery: retroaortic, interarterial and anterior to the pulmonary trunk [6]. Our patient, who has the interarterial subtype, possesses the highest risk of exercise-induced ischemia, myocardial infarction and sudden death, and her anomaly is regarded as malignant [6,8].

We believe that CT is a practical diagnostic tool for coronary artery anomalies.

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