Confirmation of an Anomalous Origin of the Right Coronary Artery from the Left Sinus of Valsalva using a Transesophageal Echocardiography

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Introduction

Right coronary artery from the left sinus of Valsalva was recognized in 0.02 percent of coronary arteriograms performed by Donaldson et al and 0.17 percent by Kimbris. This anomaly is difficul
recently, manifestations of myocardial ischemia have been described in patients with this anomaly in the absence of additional atherosclerotic or other disease processes. These manifestations have included acute myocardial infarction, angina pectoris, syncope, nonfatal ventricular fibrillation and sudden death.\(^{34,5}\)

We recently a 65-year-old female who suffered from chest pains on exertion. An anomalous origin of the right coronary artery from the left sinus of Valsalva was diagnosed by a cardiac catheterization and a transesophageal echocardiograph. And we report.

**Case Report**

A 65-year-old female visited our hospital for evaluation of frequent chest pain on exertion, first noted three years previously.

On physical examination, blood pressure was 180/100mmHg. Serum cholesterol was 228mg/dl (90–240), triglyceride 114mg/dl(30–200), high density lipoprotein cholesterol 35mg/dl(34–81), calculated low density lipoprotein 170mg/dl. Ten-

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Fig. 1. An electrocardiography revealed horizontal ST segment 1mm depression in lead II, III, aVF, V4 and V5.

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Fig. 2. A Holter recording revealed horizontal ST segment two to three mm depression accompanied by typical angina or dyspnea.
don xanthoma or xanthelasma was absent. Serum lipoprotein electrophoresis showed increase of beta fraction. She had no previous history of diabetes mellitus or cigarette smoking. She was not obese.

An electrocardiography revealed horizontal ST segment 1mm depression in lead II, III, aVF, V4 and V5 (Fig. 1). A Holter recording often revealed horizontal ST segment 2 to 3mm depression accompanied by typical angina or dyspnea (Fig. 2). Cardiac catheterization revealed a 90% stenosis of obtuse marginal branch just branching from a proximal circumflex coronary artery and origin of the right coronary artery from the left sinus of Valsalva. With an Amplatz L1 catheter, the right coronary artery selectively catheterized and revealed that the origin of the right coronary artery was anterior to the orifice of the left main coronary artery, and vessel coursed between the aorta and pulmonary artery. And also there was 80% stenosis of the distal right coronary artery (Fig. 3).

Transesophageal color Doppler echocardiographic examinations were performed with an aloka SSD-870 system (Tokyo) with the use of a transesophageal Doppler probe that included a 5-MHz transducer. The origin of the right coronary artery was from the left sinus of Valsalva and anterior to the origin of the left coronary artery (Fig. 4). She was maintained on treatment with a combination of isosorbide dinitrate, diltiazem and atenolol. But she did not become free of angina. And so we recommended her to have an angioplasty but she refused doing that.

**Discussion**

It is well established that origin of the left main coronary artery from the right sinus of Valsalva with subsequent coursing between the aorta and
pulmonary trunk may produce cardiac dysfunction including angina pectoris, nonfatal ventricular fibrillation and sudden death.

Origin of the right coronary artery from the left sinus of Valsalva has been considered a minor congenital anomaly of no clinical significance. But recently several reports suggested that origin of the right coronary artery from the left sinus of Valsalva could produce symptoms of cardiac dysfunction that maybe fatal\(^3\)\(^-\)\(^5\). Cheitlin\(^3\) and Benge\(^5\) reported young adult males with inferior myocardial infarctions in the distribution of nonatheromatous aberrant right coronary arteries.

Roberts\(^5\) reported necropsy findings in 10 patients in whom the right coronary artery arose from the left aortic sinus. Three of these patients died suddenly during physical exertion and death was attributed to the anomaly. In all 10 patients the ostium of the right coronary artery was slit-like. In contrast, the left main orifice was round. The mechanism of cardiac dysfunction was unclear. But possibly, the anomalous artery is compressed during its course between the aorta posteriorly and the pulmonary trunk anteriorly during exercise. A more likely possibility is diminished flow into the anomalous right coronary artery due to its upright slit-like origin from the aorta and its peculiar orientation to the midportion of the lumen of the aorta.

Brandt\(^8\) reported a 35-year-old man had definite evidence of inferior-wall myocardial infarction and again had severe chest pain. Cardiac catheterization revealed a normal left coronary artery from the left sinus of Valsalva. Coronary artery bypass surgery was done. He was still asymptomatic after surgery. Doppler flow studies at the time of surgery indicated that coronary reserve, as assessed by reactive hyperemia after transient occlusion, was decreased by almost 50 percent.

Origin of the right coronary artery from the left sinus of Valsalva is difficult to demonstrate angiographically\(^7\). This anomaly must be considered when the right coronary artery is not found in the right sinus of Valsalva.

In King III's experience, Amplatz-type left coronary artery catheters had been the most successful catheter\(^9\).

We also succeeded in demonstrating this anomaly with an Amplatz L1 catheter. I think that a correct diagnosis of this anomaly is important, especially to patients with angina in consideration that this anomaly is difficult to demonstrate angiographically and can cause a fatal cardiac dysfunction but the use of coronary bypass surgery for treatment has been reported. In that case, I think that the role of a transesophageal echocardiography is great in diagnosing as a noninvasive study.

We could confirm this anomaly in our patient using a transesophageal echocardiography without a surgery. In the future, I think we can get more information with a transesophageal echocardiography in diagnosis and treatment of the left ostial disease, the left main disease and the anomalous origin of the coronary artery.

**Conclusion**

We think that we can have more information with a transesophageal echocardiography in diagnosing an anomalous origin of the right coronary artery from the left sinus of Valsalva, especially when catheterization failed to demonstrate this anomaly.

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**References**

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