

# Characterizing an Absent Right Coronary Artery through 3-Dimensional Coronary Computed Tomography Angiography

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A 43-year-old man presented with exertional dyspnea and chest tightness for two months. He received coronary computed tomography angiography and the result revealed a single coronary artery, a rare congenital coronary artery anomaly.

## Keywords

Absent right coronary artery; single coronary artery; congenital coronary anomaly; coronary computed tomography angiography

A 43-year-old man, who was previously healthy, presented at our clinic with exertional dyspnea and chest tightness for two months. The patient had never smoked and he had no family history of coronary artery disease. The laboratory studies revealed mild hyperlipidemia with elevated serum cholesterol (214 mg/dL) and triglycerides (186 mg/dL), respectively. The serum glucose level and the blood pressure were within normal range. An electrocardiogram revealed a normal sinus rhythm without abnormal findings. Coronary computed tomography angiography was performed using a 2 × 128-slice dual-source dual-energy CT scanner (SOMATOM Definition Flash, Siemens Healthcare, Erlangen, Germany). Image acquisition was performed with a volume of imaging data acquired from the level of the tracheal bifurcation through the diaphragm by using prospective electrocardiography gating according to the heart rate. The imaging revealed a normal course of the left anterior descending artery with no calcified nor non-calcified plaque. However, the right coronary artery was absent. Instead, a large branch originating from the left circumflex artery and passing through the atrioventricular groove supplied the right coronary artery territory. Since there was complete absence of the right coronary artery with no stump or dense network can be identified, the diagnosis of single coronary artery was established (Fig. 1 and Fig. 2).

Single coronary artery is a rare congenital coronary artery condition with an incidence of approximately 0.04%. It is a congenital anomaly in which only one coronary artery is derived from the si-

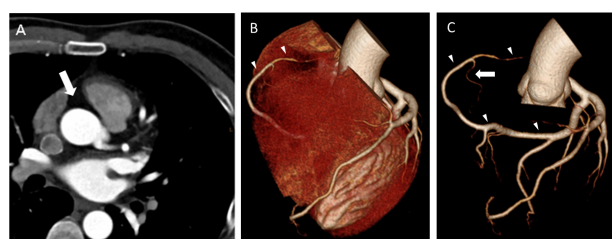


Figure 1. (A) Absence of coronary artery originating from the right sinus of Valsalva (arrow). (B) and (C) 3-dimensional reformatted image reveals that a large single left coronary artery gives off the anterior descending branch in the usual manner and then continues on the atrioventricular groove as the left circumflex branch (arrowheads); from the left circumflex artery going through the atrioventricular groove, it continues beyond the crux into the right atrioventricular groove to supply the marginal branch (arrow in C) to the right ventricle.

nus of Valsalva and 40% of these cases are associated with other congenital cardiac anomalies. The clinical presentations and the prognosis of this congenital anomaly vary widely. Lipton et al (Lipton et al., 1979; Mandal et al., 2013) established a classification method for the single coronary artery phenomenon on the basis of the arterial branch site of origin and the route of the large transverse trunk. In group 1, similar to our case, the solitary vessel follows the course of either a normal right or left coronary artery. In group 2, a single coronary artery arises from the right or left sinus from which a very large trunk crosses the base of the heart to arrive in the region of the normal contralateral coronary artery. In group 3, a single coronary artery originates from the right sinus of Valsalva, and the circumflex and anterior descending branches may arise separately from a common trunk. In type II-B case, the main collateral coronary artery passing between the aorta and main pulmonary artery may cause sudden death due to compression of the great vessels. Other types of the single coronary artery

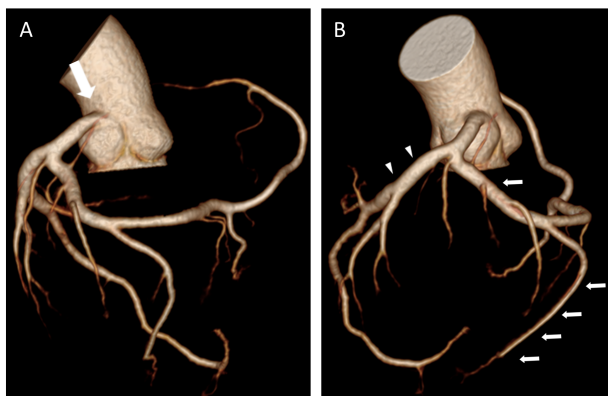


Figure 2. (A)Posterior view shows the origin of the single left coronary artery, which is normal in appearance without narrowing or deformity. (B) Left view shows the course of the left anterior descending artery (arrow head), left circumflex artery (arrow) and left marginal artery (arrows).

anomaly have been reported to have good prognosis without a decrease in life expectancy. In our case, since there was no definite compression of the origin or course of major coronary arteries, we believe the symptom is non-specific and not related to the absence of right coronary artery.

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## Conflict of Interest

The authors declare no competing interests.

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