

Type-IV Quadfurcation of Single Coronary Artery from the Right Aortic Sinus: New Classification

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Dear Editor,

We recently published a case report in European Heart Journal Case Reports.¹ We proposed a modified version of Lipton's classification, a new classification for single coronary artery (SCA), named Rajan's and Kotevski's TYPE-IV (R-IV-C) modified Lipton's classification, which we describe in detail below.

In 1699, Fantoni was the first to identify the SCA.² In 1716, German anatomist Adam Christian Thebesius first reported the existence of a SCA.³ Later, in 1841, Austrian anatomist Josef Hyrtl defined a SCA.⁴ In 1903, Banchi described it in an article on coronary morphology.⁵ In 1967, Halperin et al,⁶ demonstrated a SCA anomaly using conventional angiogram during an antemortem autopsy. Among the congenital coronary anomalies,⁷⁻⁹ SCA arising from the right is extremely rare, and its prevalence during coronary angiogram was reported as 0.02–0.05%.¹⁰ It is a condition where the entire left coronary system arise from the right coronary sinus along with the right coronary system.¹¹

Our previously reported case of inferior wall ST-elevation myocardial infarction during primary percutaneous coronary intervention described the presence of SCA arising from the right aortic sinus that quadfurcated into left anterior descending (LAD) coronary artery, first diagonal (D1), left circumflex (LCx) coronary artery, and right coronary artery (RCA). The final angiographic appearance was similar to a trident, and we named it as TRISHULA (trident) appearance.¹ Coronary computed tomography (CT) was performed to determine the anatomy and distribution of coronaries. Single coronary ostium arising from the right was confirmed and had three abnormal courses

of coronary arteries. Only RCA had a normal course. LCx had a retroaortic course, LAD had pre-pulmonic course, and D1 had a sub-pulmonic (septal) course. There was no interarterial course found in this case. The TRISHULA appearance was more evident in CT coronary angiogram.

SCA arising from the right sinus has the following distribution: 1) anterior to aorta and pulmonary artery; 2) interarterial; 3) interseptal; and 4) retroaortic.¹² In our case, we had all three abnormal courses except interarterial.

Based on anatomical distribution, Lipton et al,¹² classified SCA into three types. Type I is rare. Here, SCA is distributed along the RCA course and continues as LCx artery, then as LAD or as left main artery, which again branches into the LAD and LCx and travels through the crux and forms the RCA. Type II is the most common, here SCA bifurcates into the right and left coronary arteries. Then the left system divides into LAD and LCx. Type III SCA which divides into RCA, LAD, and LCx.¹³

Our patient does not fall in any of the types described above. Hence we proposed a modified version of Lipton's classification and named 'Type IV (R-IV-C) Rajan's & Kotevski's classification of SCA'. By origin, the type of distribution can be from right (R) or left (L) aortic sinus. By anatomical distribution, it is type-IV where the SCA quadfurcates into RCA, LAD, D1, and LCx. By anatomical course, it can be categorized into A, B, P, S, and C: A – anterior to aorta and pulmonary artery (benign), B – between aorta and pulmonary artery (malignant), P – posterior to aorta and pulmonary artery (benign), S – septal course or myocardial bridge (malignant), and C – combination of diverse routes. Type IV (R-IV-C) Rajan's and Kotevski's cases are rare and

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have SCA, which quadfurcates into RCA, LAD, D1, and LCx.

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