

# Single Coronary Artery With Coronary Occlusive Disease: A Case Report

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## Introduction:

Coronary artery anomalies are found in 0.2% to 1% of the population. Of the different variations from normal coronary patterns, the presence of a single coronary artery is a rare finding<sup>1,2</sup>. However, it is important for the clinician who deals with diagnosis and treatment of coronary artery disease to have a clear understanding of congenital abnormalities of the coronary arteries. Some types of coronary artery anomalies are associated with myocardial ischemia or sudden death. They may cause difficulties during angiographic procedures and in their interpretation as well as increase the risk of coronary trauma during cardiac surgery. Thus, accurate angiographic recognition is essential to ensure appropriate patient management.

## Case Report:

A non-hypertensive, non-diabetic 65 years old man came in for a routine exercise tolerance test (ETT). He was not obese and was a non-smoker with no past or family history of ischemic heart disease. The ETT was strongly positive with significant ST segment changes but no symptoms.

Coronary angiography was performed with catheterization via the right femoral artery. Injections using the left coronary catheter showed no evidence of an ostium for the left main (LM) coronary artery in the left aortic sinus of Valsalva. Catheterization and injection of the right (anterior) aortic sinus revealed a single ostium with a single coronary artery stem giving rise to the right coronary artery (RCA), left anterior descending artery (LAD) and the left circumflex artery (LCX). (See figure). The LM was tortuous and coursed between

the aorta and the pulmonary trunk.

There was severe triple vessel coronary occlusion and the patient was advised coronary revascularization surgery. Ventriculography revealed a normally contracting left ventricle. Double aorto-coronary saphenous vein bypass grafting was done and the angiographic findings were confirmed on the operating table. The patient had a normal post-operative course and has remained well, over a six year follow-up period with normal yearly ETT. At no time during the course of his illness, both prior to and following the surgery, has the patient had any cardiac symptoms.

## Discussion:

Various anatomic classifications of the single coronary artery have been proposed but Lipton's

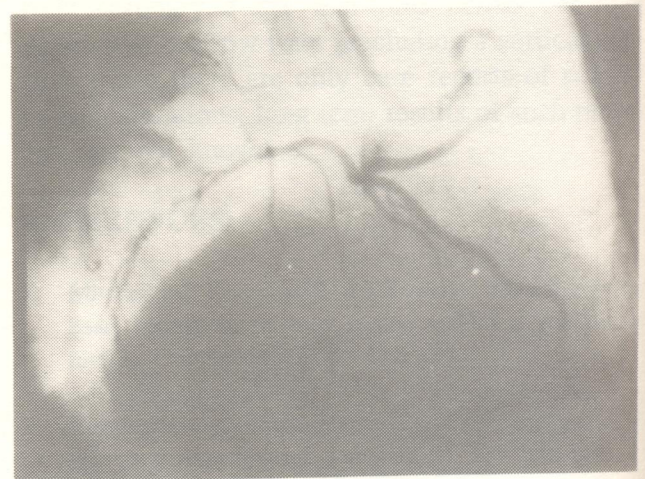


Figure 1A.  
Coronary angiography frame showing the diseased single coronary artery and its course.

classification system<sup>3,4</sup>, which divides them into nine categories, is considered the best.

There are three groups categorized as follows:

**Group I:** The single coronary artery follows the pattern of a normal right *or* a normal left coronary artery,

**Group II:** The single coronary artery divides into two branches, with distributions of the right *and* left coronary arteries, *or*

**Group III:** The single coronary artery has a distribution different from the normal coronary arterial tree.

Each of these three groups is then classified further by using the letters "R" and "L" to indicate whether the coronary ostium is in the right or left aortic sinus, and by the letters "A", "B" and "P" to

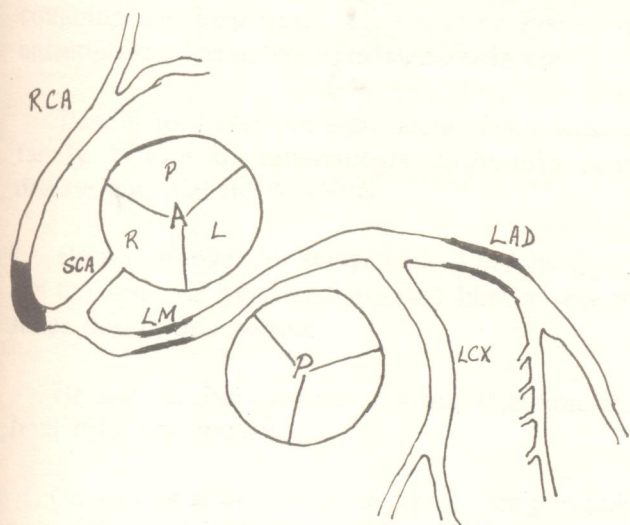


Figure 1B.

Schematic representation of course of the single coronary artery  
 A = Aortic Valve, P = Pulmonic Valve  
 SCA = Single Coronary Artery  
 P, R, L = Posterior, Right, Left Sinuses of Valsalva  
 RCA = Right Coronary Artery  
 LM = Left Main.  
 LAD = Left Anterior Descending  
 LCX = Left Circumflex

signify whether the artery courses anterior, between or posterior to the great vessels. The nine combinations possible are RI, LI, RII A, RII B, RII P, LII A, LII B, LII P and RIII.

This patient has a Lipton's RII B type of single coronary artery which means that a single artery arises from the right aortic sinus, courses between the aorta and pulmonary trunk and then divides into the left and the right coronary arteries. This anomalous origin of the left main coronary artery from the single right aortic sinus is less common than the other anomalous origins<sup>5, 6</sup>.

This origin was observed by Yamanaka and Hobbs in 22 of 126,595 coronary angiograms performed at the Cleveland Clinic from 1960 to 1988 (i.e., 0.017% incidence in a coronary angiography series)<sup>5,6</sup>. In 24,959 Coronary Artery Surgery Study (CASS) patients, 73 (0.3%) had major coronary artery anomalies with coronary artery disease. Out of these, 3 patients had origin of the LM from the contralateral sinus and only 1 had a proximal course between the great vessels as in our patient<sup>7</sup>. The senior author himself observed this anomaly only once in more than 10,000 angiograms performed.

When this anomaly occurs, the LM is known to take 1 of 4 possible pathways: (1) Interarterial, (2) Anterior free wall, (3) Retroaortic or (4) Septal courses. The interarterial course is the only one frequently associated with sudden death and myocardial infarction<sup>8,9</sup>.

This patient, thus, has an extremely rare coronary artery anomaly that has been associated with fatality due to compression. He also had severe coronary artery occlusive disease which, being a proximal stenosis, could have been devastating because of the inability to develop collateral channels. However, he has been fortunate that this was discovered incidentally and that he underwent coronary artery bypass surgery successfully. This interesting and highly unusual combination of events is unique to our case.

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