



G31 Fatal Acute Thrombosis of Anomalous Right Coronary Artery Arising From the Left Sinus of Valsalva

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Anomalous origin of coronary artery(s) may be an isolated cause of sudden death. Many different mechanisms have been suggested. The goal of this presentation is to illustrate a previously undescribed complication of this anomaly, namely fatal acute thrombosis occurring in an anomalous right coronary artery, otherwise free of atherosclerosis.

Previously postulated mechanisms of death in cases of isolated anomalous origin of coronary arteries have focused on functional insufficiency of the coronary vessel because of periodic compression, either between great vessels, or within the aortic wall. The present case suggests that another mechanism of death may be acute thrombosis of the anomalous artery. This mechanism may be related to other postulated mechanisms through intraluminal turbulence.

A 63-year-old Caucasian woman was found dead in her secure residence. She was of average height and weight with no external or internal injuries. The aorta and great veins were normally distributed; moderate atherosclerotic plaques were in the aorta. The 600-gram heart had concentric left ventricular hypertrophy, measuring up to 2.1 cm; the right ventricle was 0.5 cm; hypertensive changes were evident in the kidneys. The myocardium was uniform with no diffuse or discrete zones of fibrosis. The valves had a normal configuration, but the aortic valve cusps were partially calcified with no vegetations.

The left main coronary artery originated normally, from the left sinus of Valsalva; the left main coronary artery bifurcated to give rise to the anterior descending and circumflex branches. The right coronary artery also originated from the same ostium in the left sinus of Valsalva and traveled between the aorta and the pulmonary artery. The proximal 0.2-0.3 cm segment of the right coronary was intramural within the aorta and had an ovoid, narrow lumen. A 0.3 cm occlusive acute thrombus was within the lumen of the right coronary artery, 0.5 cm from its origin, extending for a length of 1 cm. The thrombus was in the portion of the right coronary artery interposed between the aorta and the pulmonary trunk, just distal of the intramural segment. The right coronary artery supplied the posterior apical myocardium. The coronary arteries were free of atherosclerosis.

Several mechanisms of death have been proposed in cases of isolated anomalous coronary origin. Because of the abnormal position with respect to the aorta, these vessels typically follow a course between the great vessels. One possible consequence is compression between the great vessels (a "scissors" mechanism). Since the aorta and pulmonary arteries are distended at different phases of the cardiac cycle, and because the coronaries are filled primarily during diastole, strenuous exercise, and consequent increased heart rate and shortening of the cardiac cycle, should present an increased risk of death for these patients. Indeed, most such deaths occur during strenuous exercise. Additionally, the proximal segment of the anomalous artery generally follows an intramural course; that is, it is within the aortic root, sharing tunica media with the aortic wall, without an intervening adventitia. This intramural segment typically has an ovoid cross section, and may well be further compromised with intra-aortic pressure. The latter mechanism is supported by clinical in situ intravascular ultrasound studies. In most cases the anomalous coronary emerges at an acute angle with the aortic wall, such that blood flow into the vessel would be less direct than in the "typical" arrangement. Other anatomic or functional features have been proposed, such as ostial ridges impeding flow into the vessel lumen. The present case indicates that another mechanism may occur in some patients, thrombosis of the anomalous origin. Turbulence of the intraluminal blood, perhaps caused by any (or a combination) of the other postulated mechanism(s) may lead to focal thrombosis. The absence of atherosclerosis in the thrombosed segment indicates that the anomalous origin was the likely cause of the thrombosis.

Anomalous Coronary Artery, Acute Thrombosis, Sudden Death