ABSTRACT

The coronary artery anomalies can be classified into anomalies of origin, course or termination or as hemodynamically significant or insignificant. Hemodynamically significant anomalies are characterized by abnormalities of myocardial perfusion, leading to increased risk of myocardial ischemia or sudden death. Anomalies of coronary arteries may be found incidentally in 0.3-1% of healthy individuals. Most patients are asymptomatic, and prognoses vary. The presence of anomalous coronary artery like origin of right coronary artery from left sinus of valsalva or origin of left coronary artery from right sinus of valsalva may predispose an afflicted patient to angina, myocardial infarction, congestive heart failure or even sudden cardiac death, especially if this anomaly is compounded by atherosclerotic disease.

This case describes anomalous origin of right coronary artery from left sinus of valsalva in a young male who died suddenly after complaining chest pain and breathlessness. During autopsy this rare congenital coronary anomaly was detected which was associated with atherosclerotic coronary artery disease which led to myocardial infarction and sudden cardiac death.

INTRODUCTION

The human heart is a remarkably efficient, durable, and reliable pump, distributing more than 6000 litres of blood through the body each day, and beating 30 to 40 million times a year—providing tissues with vital nutrients and facilitating waste excretion. Consequently, cardiac dysfunction can have devastating physiologic consequences.

Disruption of any element of the heart—myocardium, valves, conduction system, and coronary vasculature can adversely affect pumping efficiency, thus leading to morbidity and mortality. Now because of change in lifestyle and habits, many cardiac pathologies are noticed in comparatively younger age group even in a developing country like India and some of these cardiac pathologies are inheritable.

Inside ascending aorta in proximal part the aortic valve has three semi lunar cusps- 2 anterior and 1 posterior with a circumference of 7.5cm (6-7.5cm). Behind the cusp the aortic wall bulges to form aortic sinuses (sinuses of Valsalva). The right and left coronary arteries arise from the upper part of right and left aortic sinuses. Right coronary artery (RCA) supplies right atrium, right ventricle except the area adjoining the anterior inter ventricular groove, a small part of left ventricle adjoining the posterior inter ventricular groove, posterior part of the inter ventricular septum, whole of the conduction system of the heart except a part of left branch of AV bundle. The left coronary artery (LCA) divides into the left anterior descending artery (LAD) and left circumflex artery (LCX). It supplies left atrium, left ventricle except the area adjoining the posterior inter ventricular groove, anterior part of the interventricular septum, a part of the left branch of AV bundle. By convention, the coronary artery (either right coronary artery or left circumflex artery) that gives rise to the posterior descending branch and thereby perfuses the posterior third of the septum is called “dominant”. In a right dominant circulation, present in approximately 80% of individuals, the circumflex branch of the left coronary artery generally perfuses only the lateral wall of

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the left ventricle, and the right coronary artery supplies the entire right ventricular free wall and the posterobasal wall of the left ventricle and the posterior third of the ventricular septum. The right and left coronary arteries function as end arteries, although anatomically most hearts have collateral circulation.\textsuperscript{1,2}

The coronary artery anomalies can be classified into anomalies of origin, course or termination or as hemodynamically significant or insignificant.\textsuperscript{3} Hemodynamically significant anomalies are characterized by abnormalities of myocardial perfusion, leading to increased risk of myocardial ischemia or sudden death.\textsuperscript{4} These include an anomalous origin of either the Left coronary artery or Right coronary artery from the pulmonary artery, an anomalous course between the pulmonary artery and aorta (inter-arterial) of either the Right coronary artery arising from the left sinus of Valsalva or the Left coronary artery arising from the right sinus of Valsalva, and, occasionally myocardial bridging or congenital coronary artery fistula.

Anomalies of coronary arteries may be found incidentally in 0.3-1\% of healthy individuals.\textsuperscript{5} Most patients are asymptomatic, and prognoses vary. The presence of anomalous coronary artery may predispose an afflicted patient to angina, myocardial infarction, congestive heart failure or even sudden cardiac death, especially if this anomaly is compounded by atherosclerotic disease.\textsuperscript{6}

Case Report

A 30 years old male had chest pain and breathlessness at home and he collapsed after sometime. He was taken to the hospital where he was declared brought dead. Autopsy was conducted at the mortuary of Victoria hospital, Bangalore Medical College and Research Institute, Bangalore. On external examination the dead body measured about 168 cm in length, moderately built and nourished. Rigor mortis was present all over the body. Postmortem staining was seen over the back of the body. There were no external injuries on the body. On internal examination, Heart was enlarged, weighed 400 grams. Right coronary artery showed anomalous origin. Both left and right coronary ostia were originating from left sinus of valsalva. Left anterior descending artery was atherosclerosed and lumen was completely blocked about 1.5 cm away from its origin for a length of 2 cm. Left circumflex artery and Right coronary artery also showed atherosclerosis and their lumens were about 40\% narrowed. Grey-white areas were present at places in the myocardium near the apex of heart. Ascending aorta showed atheromatous plaques at places. Lungs showed congestion and edema. Other internal organs were congested. On histopathological examination, Left anterior descending artery showed Grade 4 to Grade 5 atherosclerosis according to American Heart Association (AHA) grading system with complete blockage of lumen. Other coronaries also showed atherosclerosis. Features of recent and old myocardial infarction were also present in myocardium near the apex of heart. On further asking the relatives of the deceased, previous history of chest pain was also present in the deceased. There was no family history of any congenital heart disease.

DISCUSSION

Among coronary artery anomalies, anomalous coronary artery from the opposite sinus (ACAOS) poses a relatively higher risk of sudden death, particularly in the young and when the anomalous artery courses between the ascending aorta and pulmonary trunk.\textsuperscript{7,8} One registry documented that of 387 sudden deaths among young athletes, 53 (13.7\%) were due to coronary anomalies, many of which were ACAOS.\textsuperscript{9}

Right ACAOS is more common than left ACAOS (where the left main coronary artery arises from the right coronary cusp) and is generally considered more benign. Myocardial ischemia and sudden death, however, can be associated with both types of anomalies.\textsuperscript{10} While it is agreed that surgical correction is the standard of care for left ACAOS when found, the management of right ACAOS is more difficult. Imaging, usually with computed tomography or magnetic resonance imaging, is helpful in defining high-risk features, including the presence of an intramural segment within the aortic wall, the shape and size of the orifice (usually slit-like), and the size of myocardium supplied by the anomalous artery. CT Coronary angiography in
In the present case, a young person had chest pain and breathlessness. He died after sometime. Right coronary artery showed anomalous origin which was diagnosed during autopsy. Both left and right coronary ostia were originating from left sinus of valsalva. This undiagnosed congenital coronary anomaly was also associated with atherosclerotic coronary artery disease which led to myocardial infarction and sudden cardiac death.

CONCLUSION

In this case report a young male was having an undiagnosed congenital coronary anomaly which was also associated with atherosclerotic coronary artery disease which led to myocardial infarction and sudden cardiac death. During autopsy on dissection of heart, right coronary artery showed anomalous origin. Both left and right coronary ostia were originating from left sinus of valsalva. This case emphasises the requirement of essential investigations like CT coronary angiography or MR coronary angiography and preventive measures or corrective surgery to prevent sudden cardiac death in young individuals having rare congenital anomalies of coronary arteries and the role of meticulous autopsy to detect them.

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