

## Case Report

# Right Coronary Artery Originating From Left Circumflex Artery: An Unusual Coronary Anomaly at Autopsy

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## ABSTRACT

*An anomalous course of coronary arteries is observed in approximately 0.3% to 1.3% of patients undergoing coronary angiography and the incidence of single coronary artery is only 0.02% to 0.04% in the general population. A single coronary artery is an unusual congenital anomaly where only one coronary artery arises from the aortic trunk in a single coronary ostium supplying the entire heart. We describe here a rare case with right coronary artery arising from the left circumflex artery with a rudimentary artery at the right coronary ostium.*

*Keywords: Coronary artery anomaly ; autopsy*

## INTRODUCTION

Coronary artery anomalies are usually incidental and benign, while some have serious complications. Demonstration of coronary artery pathologies in autopsies is vital for the elucidation of cause of sudden death cases related to these lesions and for the development of new treatment approaches when detected incidentally.<sup>[1,2]</sup> Awareness of anatomical variations is important for making the right diagnosis during coronary angiography.

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## CASE REPORT

Autopsy was conducted on a 40 year male who died in a road traffic accident. Heart dissection showed left main trunk giving rise to left anterior descending artery and left circumflex artery. The right coronary artery was seen to be branching off from the left circumflex artery with a small rudimentary artery being present at the right coronary ostium (Fig 1a). The coronary arteries were firm in consistency with thickened wall. The aorta on dissection showed well formed atherosclerotic plaques with calcification (Fig 1b). Microscopically coronary arteries showed well formed atherosclerotic plaques with specks of calcification (Fig 2a & 2b). Patient did not have past history of chest pain or cardiac symptoms and was absolutely normal before the accident. No family history of cardiac disease was noted.

Fig 1. a. Gross photograph showing dissected rudimentary right coronary artery along with coronary ostium and right coronary artery arising from left circumflex artery. b. Gross photograph of dissected aorta showing well formed atherosclerotic plaques with calcification.

## DISCUSSION

Anomalous origin of right coronary artery is a rare congenital anomaly that was first described in 1948 by White and Edwards.<sup>[3]</sup> A single coronary artery occurring in isolation without associated congenital heart disease is a rare anomaly.<sup>[1]</sup> The reported incidence is 0.02% to 0.04% in the general population.<sup>[1]</sup> They are usually incidentally detected during routine coronary angiography performed to evaluate coronary artery disease or during screening tests done for the recruitment in military jobs.<sup>[1]</sup> Multiple growth factors, adhesion molecules and chemostatic factors are involved in the development of the coronary vasculature.<sup>[4]</sup> Anomalies of these signalling pathways are responsible for coronary artery anomalies.<sup>[4]</sup>

The anomaly observed in this case with normal anatomy of the left main trunk, left anterior descending artery and left circumflex artery with right coronary artery arising from left Circumflex artery and a small rudimentary

Fig 2. a. Microphotograph of coronary artery showing well formed atherosclerotic plaque. H&E x100. b. Microphotograph of coronary artery showing atherosclerotic plaque with cholesterol crystals and specks of calcification. H&E x400

artery being present at the right coronary ostium is a rare phenomenon. In a series of 8500 consecutive coronary angiographies, Neuhaus et al reported 3 (0.035%) cases of anatomically single coronary artery with origin of right coronary artery from the atrioventricular branch of the dominant circumflex artery in the absence of other coronary artery disease or other cardiovascular abnormalities.<sup>[5]</sup> Tavernarakis described one case of anomalous right coronary artery from peripheral segment of left circumflex artery among 3100 selective angiograms performed in the absence of any clinical abnormality.<sup>[5]</sup> Ho et al reported a case of anomalous origin of right coronary artery from the left coronary sinus who presented with episodic syncope.<sup>[5]</sup>

In the present case along with the coronary artery anomaly, microscopic study of the coronary arteries showed the presence of widespread atherosclerotic lesions including thick and thin fibrous cap atheroma with near

complete occlusion of the lumen along with many areas of calcification in the atherosclerotic lesions. In addition all the segments of aorta also showed similar degree of involvement by atherosclerosis.

Coronary anomalies might have clinical consequences such as volume overload, aortic root distortion, bacterial endocarditis and complications during aortic valve surgery.<sup>[6]</sup> It is well established that an anomalous origin of the right coronary artery can lead to angina pectoris, myocardial infarction or sudden death in the absence of atherosclerosis.<sup>[6]</sup> When these anomalies are associated with widespread atherosclerosis like in the present case, they become doubly dangerous.

Very few reports have addressed this particular coronary anomaly in the past with an incidence of 0-0.035%.<sup>[2]</sup> The earlier reported cases were classified under the L-1 pattern of Lipton classification, where there is a single left coronary artery with congenital absence of the right coronary ostium.<sup>[2,7]</sup> In the present case, the presence of a rudimentary small artery at the right coronary ostium with widespread atherosclerosis in the coronary arteries and the aorta sets this case apart from the rest of the cases reported earlier with the above said right coronary anomaly.

## CONCLUSION

In conclusion, we present a case with right coronary artery arising from left circumflex artery with a small rudimentary artery at the right coronary ostium. The presence of widespread atherosclerosis and the rudimentary artery at the right ostium highlights the difference between

this case and earlier reported cases with a similar anomaly. The importance lies in the recognition of these anomalies at cardiac catheterization. These patients may present with symptoms of coronary disease in a more critical manner owing to the dependence on a single coronary artery.<sup>[1]</sup> Such overdependence is exemplified in this case leading to widespread development of atherosclerosis due to increased hemodynamic stress on the single coronary artery and in conjunction with other risk factors which lead to development of atherosclerosis.

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