

Case Report

Unidirectional communication between the circumflex and right coronary arteries: a very rare coronary anomaly and cause of ischemia

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Abstract

Intercoronary communication is an exceptionally rare congenital malformation. A 43-year-old male was admitted to our cardiology department with symptomatic stable angina. ECG and echocardiography was normal. Exercise electrocardiography showed ST depression in inferior leads. No atherosclerotic plaque in the coronary arteries was detected on coronary angiography. However, a unidirectional intercoronary communication between the circumflex and right coronary arteries, which was leading a coronary steal from right to left, was observed. Although intercoronary communication is generally not related with ischemia, ischemic symptoms and exercise ECG changes of this case suggested that unidirectional flow might cause myocardial ischemia via coronary steal. Consequently, intercoronary communication, a very rare coronary anomaly and a cause of ischemia, is discussed in this case report.

Background

Congenital anomalies of the coronary arteries occur in 0.2–1.2% of the general population [1]. Intercoronary communication is a rare condition in which there is an open-ended circulation with bidirectional blood flow between two coronary arteries [2]. This ‘abnormality’ can be distinguished from collateral arteries by its angiographic features, and it does not reflect an underlying coronary disease [3]. In this report, we conducted a case of an intercoronary connection between the right coronary and circumflex arteries with unidirectional flow as a cause of myocardial ischemia.

Case presentation

A 43-year-old man presented with symptomatic stable angina. The patient had only a smoking history as a risk factor for coronary artery disease. Physical examination was normal. His blood pressure was 115/70 mm Hg, and heart rate was 70 beat/min and regular. ECG was normal. Also, blood count, biochemical parameters, including lipid levels and cardiac enzymes, and chest X-rays were all normal. Maximal treadmill exercise showed 1.5 mm horizontal ST segment depression in leads II, III, aVF (Figure 1). Coronary angiography was then performed. Left and right coronary angiography did not show any evidence

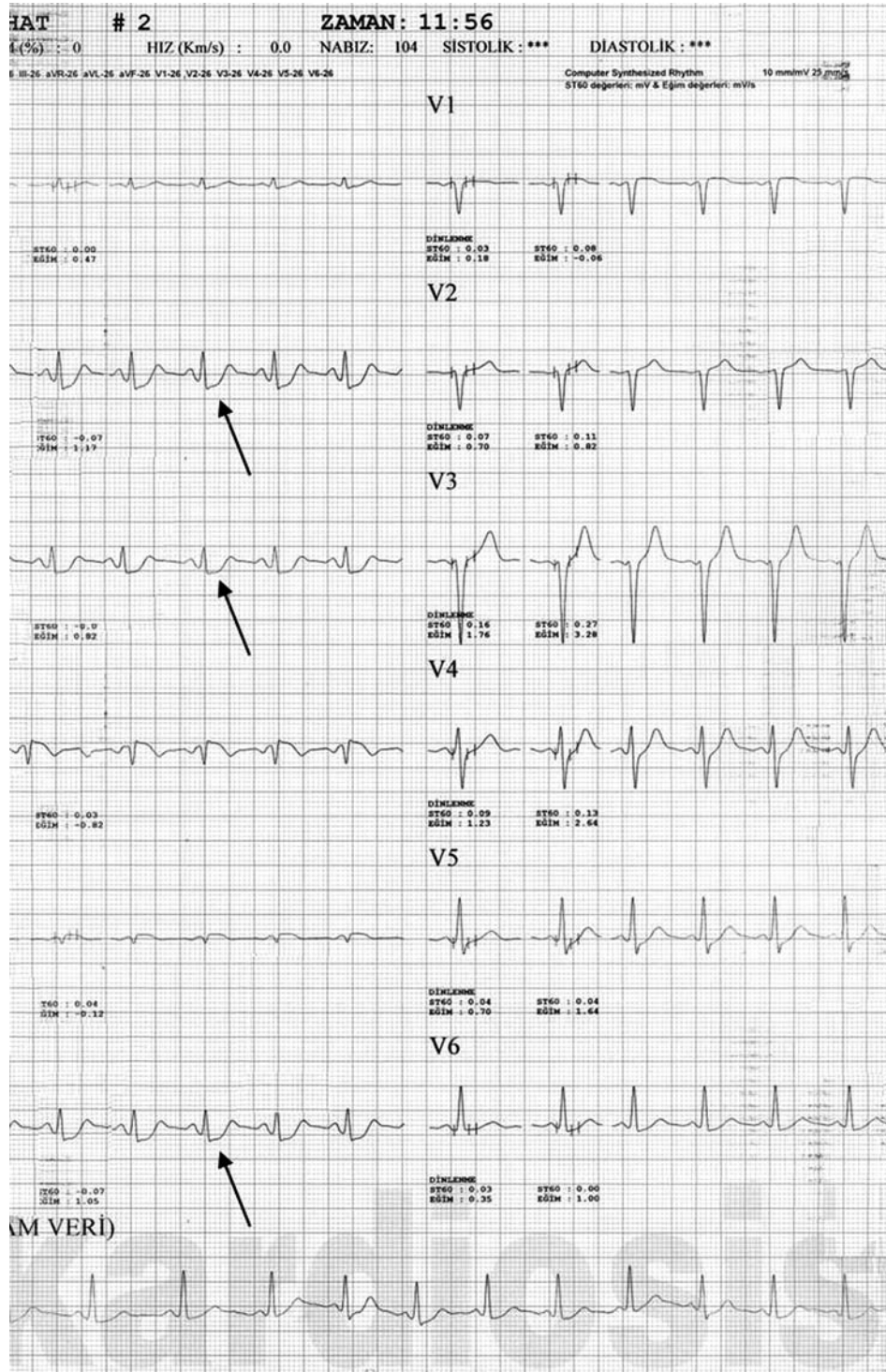


Figure 1. Exercise ECG showed horizontal ST segment depression in leads II, III, aVF.

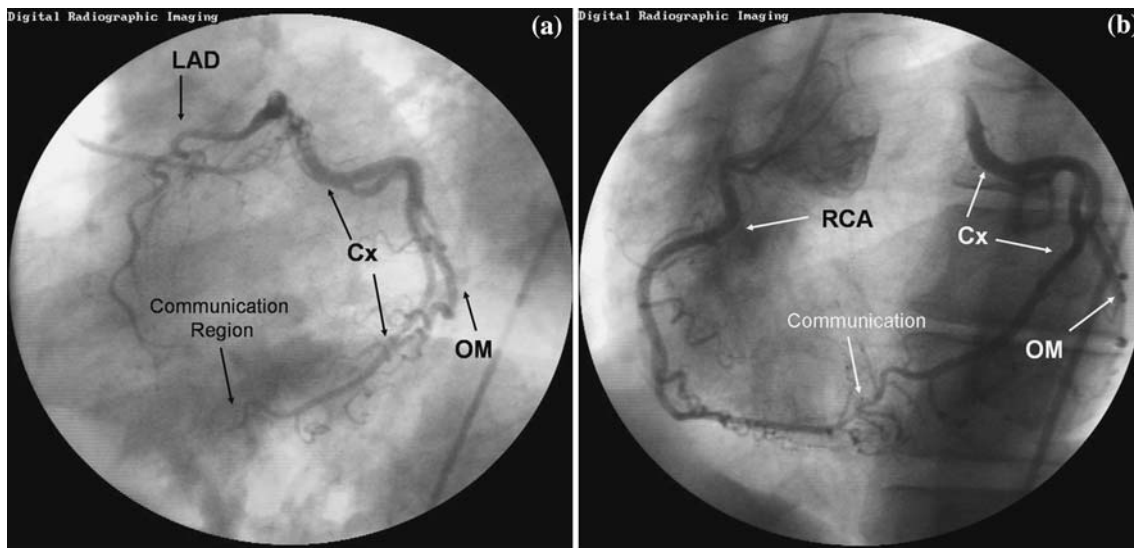


Figure 2. Selective injection of the circumflex coronary artery showed no flow from it into the right coronary artery (a), but injection of right coronary artery (RCA) showed retrograde filling of the circumflex artery via the communication (b).

of luminal narrowing or occlusion of either coronary artery. Selective injection of the right coronary artery (RCA) showed retrograde filling of the circumflex artery (Cx) and obtuse marginal branch, but left coronary injection did not fill the RCA (Figure 2a, b).

Discussion

Intercoronary communication is a very rare anomaly of the coronary circulation. Arat-Ozkan et al. reported one case among 12,674 angiograms [4]. The true incidence of this entity is unknown. Two type intercoronary communications have been defined: (1) most common was the communication between the anterior and posterior interventricular arteries in the distal portion of the posterior interventricular groove, and (2) communication between distal RCA and Cx arteries in the posterior atrioventricular groove, as described in our case.

It is thought that this connection is of congenital origin. Faulty embryological development allows the existing intercoronary channel to remain prominent [5]. The histologic structure has the

characteristics of a normal arterial wall so that persistence of the fetal coronary circulation was suggested as the underlying mechanism. Intercoronary connection constitutes a diagnostic pitfall because, in contrast to collateral circulations that are secondary to coronary stenosis or hypoxia, it is not an indirect sign of occlusive coronary artery. Intercoronary arterial connections are larger in diameter, extramural, and straight compared with collaterals. Also, the histologic structure of the connecting vessel has the characteristics of a normal arterial wall, with a well defined muscular layer.

In our patient, selective injection of the RCA showed retrograde filling of the Cx and obtuse marginal branch, but left coronary injection did not fill the RCA. Although the Cx was normal, selective angiography of the RCA filled the Cx retrogradely. There are controversial thoughts regarding functional significance of intercoronary connections. It may play a protective role if lesions develop on one of the two vessels it links together [6]. However Donaldson et al. reported a case with >95% narrowing of the RCA in which left anterior descending artery-posterior descending artery continuity did not prevent extensive transmural

infarction in the distribution of the posterior descending artery, so that the theoretical protective role of 'the potential self-cure' is questionable [7]. There is no report regarding to this anomaly that it may be a cause of myocardial ischemia. In our patient, it may be responsible for his complaints and exercise ECG changes, because there was not obstructive coronary disease and unidirectional intercoronary communication is a type of coronary fistula. In coronary artery fistulas, the ischemic manifestation is apparently caused by inadequate perfusion due to coronary steal [8]. A 'coronary steal' phenomenon caused by the unidirectional intercoronary communication may induce myocardial ischemia (as in coronary fistula).

In conclusion, intercoronary communication is a very rare condition, and unidirectional coronary communication may be responsible from myocardial ischemia.

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