Intercoronary communication between the left circumflex and the right coronary arteries: an extremely rare coronary artery anomaly

Marcos Danillo Peixoto Oliveira1, Ednelson Cunha Navarro2, Lis Bastos Zampier1, Laura Fadel Monteiro dos Santos3, Isabel de Araújo Pedroso1, Glenda Alves de Sá2, Hélio José Castello Júnior2, Marcelo José de Carvalho Cantarelli2

DOI: 10.31160/JOTCI20192720180008

ABSTRACT – Coronary artery anomalies are congenital changes in their origin, course, and/or structure. Intercoronary communication is a very rare subset with uni- or bidirectional blood flow between two or more coronary arteries. We present the case of a 70-year-old male patient with acute coronary syndrome, and his coronary angiography incidentally showed a surprising and very rare communication between the left circumflex and right coronary arteries.

Keywords: Coronary vessel anomalies; Intercoronary communication; Coronary angiography

INTRODUCTION

Coronary artery anomalies (CAA) comprise a diverse group of congenital disorders, and the pathophysiological mechanisms and manifestations are highly variable. Their incidence range from 0.03% to 0.2% of patients undergoing routine catheterization.1 Intercoronary communication (ICC) is a very rare subset of CAA with uni- or bidirectional flow between two or more coronary arteries.2 We present an extremely rare case of bidirectional ICC between the left circumflex artery (LCx) and right coronary artery (RCA), with no occlusive coronary artery disease, incidentally diagnosed by coronary angiography due to acute coronary syndrome.

CASE REPORT

An active 70-year-old Caucasian male patient, former smoker, presenting type 2 diabetes mellitus and hypertension, with no previous episode of acute myocardial infarction (MI), stroke or coronary artery disease, but with positive family history for risk factors of such conditions. He was admitted to the emergency room with nausea, vomiting and epigastric pain followed by lipotymia. Due to elevated cardiac troponin levels and anterolateral subepicardial ischemia on electrocardiogram, the patient was referred to coronary angiography. Despite the absence of any significant stenosis in the coronary circulation, a very curious finding was detected. Selective angiographies

How to cite this article:
of the RCA showed retrograde filling of all LCx branches, from the distal portion of the RCA, with a bidirectional flow pattern (Figure 1, and Videos 1 and 2). Similarly, selective injections in the left coronary artery (LCA) showed the retrograde filling of the distal portions of the RCA, with the same bidirectional flow pattern (Figure 2 and Video 3). These retrograde fillings were not related to collaterals, but to a direct ICC.

**Figure 1.** Contrast injection in the right coronary artery showing retrograde filling of the left circumflex artery and its branches, with a bidirectional flow pattern. The white arrow indicates the direct intercoronary communication, while the black arrows show the right coronary artery and left circumflex artery.

**Video 1.** Contrast injection in the right coronary artery showing the retrograde filling of the left circumflex artery and its branches, with a bidirectional flow pattern.

**Video 2.** Contrast injection in the right coronary artery showing the retrograde filling of the left circumflex artery and its branches, with a bidirectional flow pattern.

**Figure 2.** Contrast injection in the left coronary artery showing the retrograde filling of the right coronary artery and its branches, with a bidirectional flow pattern. The white arrow indicates the direct intercoronary communication, while the black arrows, the left circumflex artery and the right coronary artery.
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J Transcat Intervent. 2019;27:1-3

Journal of Transcatheter Interventions

DISCUSSION

CAA are congenital changes in their origin, structure, and/or course. Several controversies remain in terms of their incidence, classification, screening, heredity and treatment. Despite being mostly asymptomatic, clinical presentation in adults may result from myocardial ischemia, manifesting as angina, syncpe, arrhythmias, and even sudden death. In young athletes, apparently healthy, they are the second most frequent cause of sudden death.1,3

ICC is a very rare congenital CAA defined as an open-ended circulation with uni- or bidirectional blood flow between two (or more) coronary arteries.4 It differs from collateral arteries and fistulas regarding its angiographic features, and does not usually reflect underlying coronary artery disease.5,6

Compared to collaterals, ICC is larger in diameter (generally >1mm), extramural, and straight. The histological structure of the connecting vessel has the characteristics of a normal arterial wall, with a well-defined muscular layer.2,5,6

Coronary artery fistulas, in turn, are abnormal communications between a coronary artery and a cardiac chamber or major vessel.7 They may be congenital or acquired due to trauma or iatrogenic causes.5

ICC is rarely seen during coronary angiography in patients with and without coronary artery narrowing.2,6 Yamanaka and Hobbs reported the incidence of ICC of 0.002% in a very large study comprising 126,595 patients.4

Two types of ICC have been reported so far: between left anterior descending and posterior descending arteries in the distal interventricular groove, and between the LCx and RCA in the posterior atrioventricular groove,2,4,5 as shown in our case.

Oliveira et al.10 recently reported a similar case of direct communication between the LCx and the RCA.

The real significance of ICC and its consequences are still unknown. Some authors believe that these connections may play a protective role in the myocardium, if any significant coronary artery obstruction develops in one of the connecting vessels. In turn, myocardial ischemia can result from the phenomenon of coronary steal, by the unidirectional flow.2,8

In the present case, since there were no obstructive coronary lesions in none of the coronary arteries, we believe that the reported ICC may be the cause of acute coronary syndrome suffered by the patient.

SOURCE OF FINANCING

None.

CONFLICTS OF INTEREST

The authors declare they have no conflicts of interest.

REFERENCES