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Case Report

Large intercoronary communication between the right coronary artery and the left circumflex artery in a patient with late stent thrombosis: A case report ☆,☆☆

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ABSTRACT

Intercoronary communication (ICC) is a very rare coronary artery anomaly that connects directly 2 coronary arteries. This anastomosis is found between 2 nonobstructed coronary arteries with unidirectional or bidirectional blood flow. We report a case of a large ICC between the right coronary artery and the left circumflex artery in a patient with late stent thrombosis. The electrocardiogram showed ST-segment elevation in the anterior leads. The echocardiography investigation revealed hypokinesis in the proximal, medial and apical segments of the interventricular septum and anterior wall as well as the apex. During invasive coronary examination a large ICC between the left circumflex artery (LCx) and the right coronary artery (RCA) was found. Furthermore, coronary angiography demonstrated proximal occlusion (stent thrombosis) of the left anterior descending artery (LAD), prompting the utilization of percutaneous intervention with a drug-eluting stent. The presence of a large intercoronary communication is an exceedingly uncommon anomaly of the coronary arteries, which has the potential to induce myocardial ischemia. In individuals with obstructive coronary artery disease, this anomaly can further worsen the existing condition.

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Introduction

Intercoronary communication (ICC) is a very rare coronary artery anomaly, with an incidence of 0.002%-0.05% [1,2]. Two or more coronary arteries are connected between them, with open-ended circulation and unidirectional or bidirectional blood flow [3,4]. Compared to collateral vessels, ICC are single, extramural, straight and larger in diameter (>1mm), histologically well-defined muscular layer, and does not usually develop after coronary artery disease [5–7]. Unlike ICC, coronary artery fistulas (CAFs) are abnormal communications between the coronary arteries and cardiac chambers or major vessels, which may be congenital or acquired [8]. The incidence of CAFs is about 0.13%-0.22% of adult patients during coronary angiography [9].

We present a case with large tortuous intercoronary communication between the right coronary artery and the left circumflex artery who presented in a patient with late stent thrombosis.

Case presentation

Patient information

A 70-year-old man was admitted to our clinic for evaluation of chest pain.

The pain was described as tightness in the chest that was spread to the back and both arms. Other additional symptoms were dyspnea, vomitus and diaphoresis. Patient reported percutaneous coronary intervention (PCI) of left anterior descending (LAD) artery 10 months ago.

Clinical findings

Physical examination showed a heart rate of 85/minute and blood pressure of 125/80 mmHg. His cardiac examination revealed a grade 3/6 continuous murmur on the left sternal

border, while pulmonary examination demonstrated bilateral basal fine crepitations.

Diagnostic assessment

Laboratory findings revealed elevated cardiac biomarkers: creatine kinase-MB (CK-MB) level of 70IU/L (5-25IU/L) and cardiac troponin T (cTnI) level of 6.4ng/mL (0.00-0.16ng/mL). His electrocardiogram showed ST-segment elevation in the anterior leads. Echocardiography demonstrated hypokinesis in the proximal, mid and apical segments of the interventricular septum and anterior wall as well as the apex. Coronary angiography showed a large intercoronary communication between the left circumflex artery (LCx) and the right coronary artery (RCA) (Fig. 1) (1A-left anterior oblique view [LAO] for RCA and 1B-right anterior oblique [RAO] caudal view for LCx). Also, in RAO caudal projection was demonstrated proximal occlusion (stent thrombosis) of LAD (Fig. 2A).

Therapeutic intervention

Left main coronary artery (LMCA) was engaged with 6F EBU 4 guide catheter and percutaneous intervention was performed with a drug-eluting stent, with diameter of 3.0 mm and 28 mm length (Fig. 2B). Repeat coronary angiography revealed thrombolysis in myocardial infarction (TIMI) 3 flow in the infarct-related artery (IRA).

Discussion

Intercoronary communication, otherwise known as intercoronary continuity, presents direct communication between 2 nonobstructed coronary arteries [10,11]. A large ICC is an extremely uncommon coronary artery anomaly. In one of the largest studies, the reported incidence of ICC was 0.002%, whereas it was 0.05% in all diagnostic coronary angiographies [12–14]. Most common type of ICC is between the atrioventricular branch of the RCA and LCx arteries followed by the distal LAD and distal posterior descending (PD) branch of the RCA.

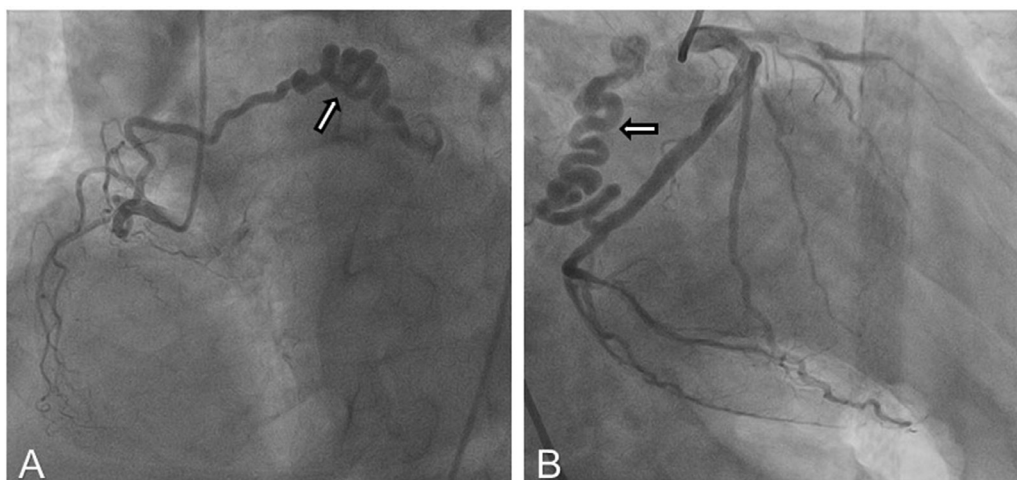


Fig. 1 – Intercoronary communication between the right coronary artery (A) and the left circumflex artery (B).

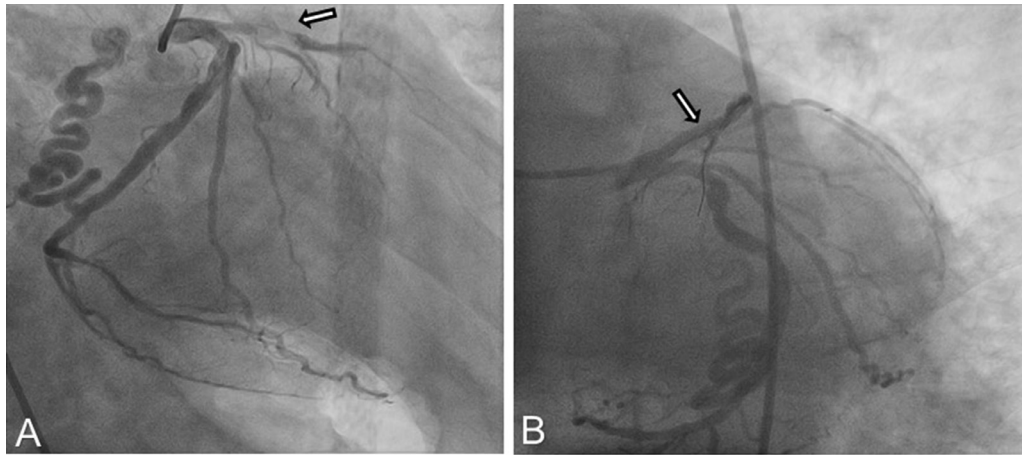


Fig. 2 – Stent thrombosis and percutaneous coronary intervention (PCI), before PCI (A) and post-PCI (B).

ICC is a congenital anomaly with the persistence of the fetal coronary circulation as the underlying mechanism [15,16]. Therefore, inadequate embryological development, marked by the prominence of the intercoronary channel, can lead to the formation of communicating vessels, often associated with conditions such as coronary stenoses or hypoxia, and is characterized by formation of collateral circulations [3,4,10]. The histological structure revealed well-defined muscular layer as normal arterial wall in ICC compared to collateral vessels, which has histological structure similar to arterioles [10,17,18]. In angiographic features, the intercoronary communications are single, extramural, straight and larger in diameter (>1 mm), whereas the collateral circulation is helical and no more than 1 mm in diameter [5,10,7].

The coronary artery flow can be unidirectional or bidirectional determining significance of ICC [19]. Unidirectional flow may result in coronary steal phenomenon followed by myocardial ischemia [17,18]. In the presence of a significant coronary artery stenoses, the steal phenomenon will appear as a result of autoregulatory mechanisms characterizing with maximal vasodilatation distal to the stenosis, to keep constant myocardial flow [20,21].

In our case, a possible cause of late stent thrombosis can be the redistribution of blood flow. The increase of blood flow and decreased resistance in the circumflex territory would decrease the perfusion pressure and blood flow in LAD, resulting in a deterioration of ischemia and hypoxia of the LAD vascular bed and stent thrombosis [22–24]. In our patient, the contrast injection in RCA filled the LCx artery as a result of ICC with unidirectional blood flow (Video 1).

Thus, the presence of a large ICC with unidirectional blood flow and consequent coronary steal phenomenon may induce myocardial ischemia aggravating existing coronary artery disease [4,17,25,26].

Hence, managing patients with obstructive coronary artery disease becomes clinically challenging when a large ICC is present. Recognizing that the ICC is a causative factor for myocardial ischemia, it might become necessary to address its management as well.

Conclusions

Large ICC is a very rare coronary artery anomaly, and unidirectional coronary artery flow, followed by steal phenomenon may be responsible for myocardial ischemia. The existence of a large intercoronary communication in patients with obstructive coronary artery disease can further worsen the pre-existing condition.

Declarations

This manuscript or essential parts of it have not been previously published or are under consideration by another journal, in English or another language.

Availability of data and materials

All data from this study are included.

Authors' contribution

XK was the first author. XK, DK, BS, LB, AK, FV, and AB prepared the final manuscript. All authors contributed to data collection and read and approved the final manuscript.

Ethics approval and consent to participate

The approval of our local ethics committee for publication was obtained.

Patient consent

The patient provided written informed consent for the publication of this case report and its accompanying images. A copy of the written consent can be made available for review upon request by the Editor-in-Chief of this journal.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.radcr.2023.09.076](https://doi.org/10.1016/j.radcr.2023.09.076).

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