Images In Medicine

Intercoronary Connection Between the Right Coronary Artery and Left Circumflex Artery in the Absence of Obstructive Coronary Disease and Collaterals

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Introduction

Collateral coronary arteries are normally recruited in response to myocardial ischemia and the presence of collateral coronary blood flow is almost always indicative of significant underlying obstructive disease. Rarely however, intercoronary communications distinct from collaterals exist between two native coronary arteries in the absence of obstructive disease the significance of which is not clear.

Case Report

A 59 year-old male with a history of remote prior myocardial infarction presented to the hospital complaining of intermittent exertional substernal chest pressure in the absence of electrocardiographic changes or cardiac biomarker elevations. An outpatient noninvasive myocardial perfusion study demonstrated normal regional and global systolic function with a reversible apical inferior perfusion defect consistent with ischemia in the territory of the right coronary artery. At subsequent cardiac catheterization, left ventriculography demonstrated normal global and regional systolic function and coronary angiography demonstrated normal left coronary arteries. The right coronary artery (RCA) had a minimal lesion in the proximal vessel estimated to be a 20% stenosis. Selective injection of this vessel demonstrated retrograde filling of the entire left circumflex coronary artery, whereas left coronary injection did not fill the right coronary artery – consistent with a unidirectional intercoronary communication. The injection of the right coronary artery was not associated with dampening of the catheter pressure which occurs when the catheter is occlusive during the injection. The proximal right coronary artery lesion was subsequently interrogated by fractional flow reserve, which demonstrated a non-hemodynamically significant stenosis. Due to the size and morphology of the communication between the right coronary artery and the left circumflex coronary artery and the absence of significant underlying coronary artery disease this likely represented a rare (and probably congenital) primary intercoronary communication rather than a collateral.

Discussion

Collateral circulation is well recognized as an anatomic adaptation of the circulatory system to impaired blood flow through the native arterial system due to intraluminal obstruction.
Intercoronary communication, on the other hand, is a rare condition that may arise from several different possibilities.

The first possibility is that this is a congenital condition in which there is an open-ended circulation with bidirectional (or even more rarely, unidirectional) flow between two coronary arteries in the absence of obstructive coronary artery disease. The few case reports published worldwide, whether flow was unidirectional or bidirectional, there was always flow from right to left, the functional significance of which is unknown.

Another possibility is that there was previously obstructive disease present in the RCA, which led to the development of collaterals. Then with regression of the obstruction (decrease in plaque volume or positive remodeling) this may produce the findings that were documented at the time of catheterization.

Still, a third possibility is that the collateral circulation typical of obstructive coronary disease was not well visualized at the time of angiography. Contrast was not re-injected into the LCA again after the RCA. Contrast is known to be vasodilatory and it is possible that we would have seen the collaterals flowing left to right at the end of the procedure.

Intercoronary communications can usually be distinguished from collateral arteries by its angiographic features, and in and of itself does not reflect any underlying coronary artery disease. It is possible that it may play a protective role if obstructive lesions develop in either of the two linked vessels. Alternatively it might also produce artifactual ischemia on myocardial perfusion imaging due to competitive flow through the unidirectional communication – or perhaps even true ischemia if the unidirectional communication creates a coronary steal phenomenon leading to inadequate perfusion of the myocardial territory served by one of the interconnected arteries, which may explain the patient’s symptoms and abnormal perfusion study.

REFERENCES

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