Rev Bras Cardiol Invasiva. 2016;**24(1-4)**:47-49

Case Report

Intercoronary communication: a rare coronary abnormality

Renato Sanchez Antonio*, André de Oliveira Fonseca, José Fábio Fabris Jr., Vicente Paulo Resende Jr., José Luis Attab dos Santos, Ricardo de Souza Alves Ferreira

Santa Casa de Misericórdia de Ribeirão Preto, Ribeirão Preto, SP, Brazil

ARTICLE INFO

Article history:
Received 18 October 2015
Accepted 18 January 2016

Keywords:
Coronary angiography
Coronary circulation
Myocardial ischemia

ABSTRACT

Intercoronary communication or coronary arcade is a rare congenital abnormality. The authors report the case of a patient with intercoronary communication, chest pain, and electrocardiogram showing an early ventricular repolarization pattern, but no significant atherosclerosis at the coronary angiography. Nevertheless, an intercoronary communication with unidirectional flow between the right coronary artery and the left circumflex artery was visualized, and later assessed by physical stress echocardiography, which did not detect ischemia. Although intercoronary communication is usually unrelated to ischemia, there are reports in the literature that unidirectional flow can cause myocardial ischemia through coronary steal.

Comunicação intercoronária: uma anomalia coronária rara

Palavras-chave:
Angiografia coronária
Circulação coronária
Isquemia miocárdica

RESUMO

Comunicação intercoronária ou arcada coronária é uma anomalia congênita rara. Relatamos o caso de um paciente com comunicação intercoronária, com quadro de dor torácica e eletrocardiograma com padrão de repolarização ventricular precoce, mas sem aterosclerose significativa à cineangiocoronariografia. No entanto, foi visualizada comunicação intercoronária com fluxo unidirecional entre a coronária direita e a artéria circunflexa, que foi avaliada pela ecocardiografia sob estresse físico, sem detecção de isquemia. Embora a comunicação intercoronária geralmente não esteja relacionada à isquemia, há relatos na literatura de que o fluxo unidirecional pode causar isquemia miocárdica por meio do roubo coronariano.

Introduction

Knowledge of the normal anatomy of the coronary circulation, as well as associated variants and congenital anomalies, is essential for adequate patient management. In the general population, the prevalence of congenital coronary anomalies is approximately 1 to 2%.[1] The presentation of these abnormalities is variable, and they may present as clinically silent or cause potentially life-threatening situations, such as acute myocardial infarction or sudden death.[1] Intercoronary communication or coronary arcade is defined as an open circulation with bidirectional blood flow between two coronary arteries. It can be differentiated from the collateral circulation through its angiographic characteristics, and it is not usually associated with atherosclerotic coronary disease.[1]

Case report

A 62-year-old male patient, with a history of hypertension and smoking, was transferred from the Basic Healthcare Unit to the cardiac emergency room of *Santa Casa de Ribeirão Preto*, with a probable diagnosis of acute coronary syndrome. He presented retrosternal pain and tightness at rest, without other associated symptoms, with a 20-hour onset. The electrocardiogram (Fig. 1) showed an early repolarization pattern in the anterior region.

At the initial assessment, he reported mild chest pain; blood pressure was 140 × 80 mmHg, heart rate was 64 bpm; there were no heart murmurs at auscultation, and pulmonary auscultation was normal. Anti-ischemic therapeutic measures (acetylsalicylic acid 200 mg, clopidogrel 300 mg, and enoxaparin 60 mg every 12 hours)

DOI of original article: http://dx.doi.org/10.1016/j.rbci.2017.10.002
* Corresponding author: Avenida Saudade, 456, Campos Elíseos, CEP: 14085-000, Ribeirão Preto, SP, Brasil.
E-mail: renatoantonio255@hotmail.com (R.S. Antonio).
Peer review under the responsibility of Sociedade Brasileira de Hemodinâmica e Cardiologia Intervencionista.

were initiated, and myocardial necrosis markers were serially analyzed. Although the myocardial necrosis markers were negative, we chose to adopt an invasive strategy due to the patient's symptoms.

A coronary angiography was performed (Fig 2) with a 6 F radial sheath Radifocus™ Introducer II Transradial Kit (Terumo Co., Tokyo, Japan) and Multipurpose Performa™ Diagnostic Cardiology Catheter (MeritMedical, South Jordan, USA), which showed a dominant left coronary without obstructive lesions. However, left circumflex artery filling through the right coronary artery (intercoronary communication) was observed. The left ventriculography did not present segmental deficits, and the ejection fraction was estimated at 63%.

The absence of atherosclerotic disease led the authors to perform a stress echocardiogram to assess ischemia caused by the intercoronary communication, due the possibility of unidirectional flow, causing ischemia. The echocardiogram was performed under physical stress with a negative result for myocardial ischemia.

Treatment with enalapril 20 mg BID and metoprolol 50 mg QD was maintained, and antiplatelet and anticoagulant agents were suspended; the patient presented no chest pain recurrence during the hospitalization and was discharged in good clinical condition.

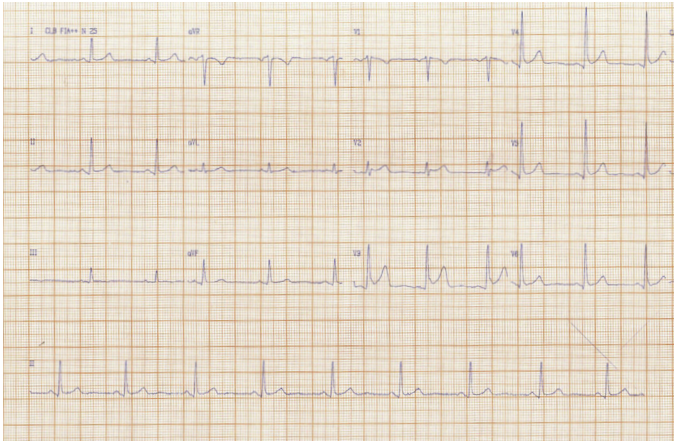

Figure 1. Electrocardiogram at admission at the chest pain unit.

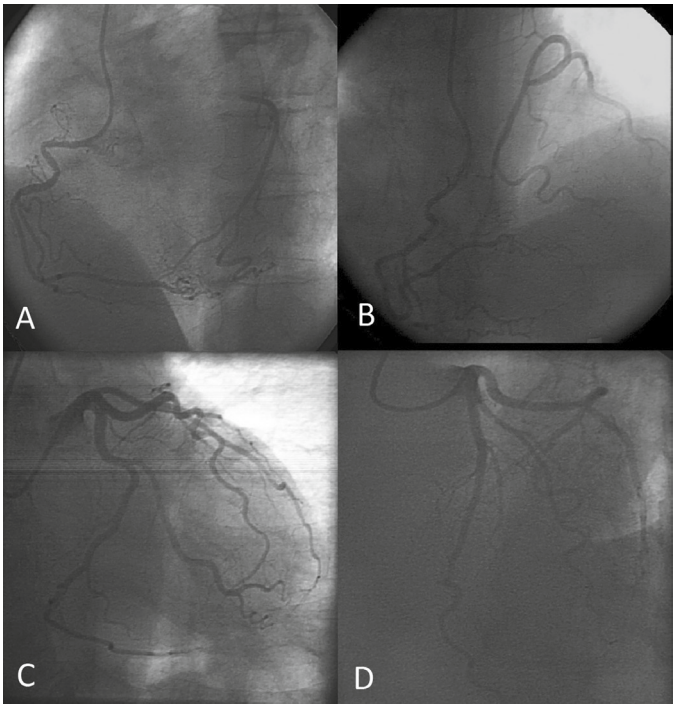

Figure 2. Coronary angiography showing the communication between the right coronary and the left circumflex arteries. Right coronary artery in left anterior oblique view and right anterior oblique cranial view (A and B). Left coronary artery in the right anterior oblique caudal view and left anterior oblique cranial view (C and D).

Discussion

Congenital alterations of the coronary anatomy are classified as variants of normality or coronary artery anomalies. Coronary circulation variants are an alternative to the normal pattern, and are relatively frequent, whereas coronary circulation abnormalities are uncommon, being observed in less than 1% of the population.[1] Coronary circulation variants and abnormalities can be divided into four major groups: abnormalities of origin, course, and termination, and intrinsic abnormalities.[2]

Intercoronary communication or coronary arcade, first observed by Cheng,[3] is a rare abnormality in which there is a two-way flow communication between two main coronary arteries. It is anatomically, histologically, and functionally different from collateral vessels. Its prevalence is not accurately known, and has been reported as ranging from 0.002 to 0.04%.[3] Approximately 0.02% of the diagnostic cardiac catheterizations show intercoronary communication, which corresponds to 1 in 5,000 normal coronary angiographies.[4]

Arterial continuities are observed in other areas, such as the superficial palmar arch of the hand, intestinal branches of the superior mesenteric artery (arc of Riolan), and the circle of Willis. Regarding intercoronary communication, two types have been described: one located in the posterior atrioventricular sulcus, between the right coronary and the left circumflex artery; and another in the interventricular sulcus, between the left anterior descending artery and the posterior descending artery.[5] This coronary circulation abnormality is presumed to be a congenital defect, a result of the persistence of the fetal pattern of the coronary circulation, from a communication between the left anterior embryonic plexus and the right posterior embryonic plexus.[5] Thus, it has been suggested that an imperfect embryonic development allows the prominent and large-caliber coronary canal to persist, as opposed to collateral circulation, which is often associated with significant coronary artery stenosis.[4,6] However, there have been reports that the development of intercoronary communication, in the absence of obstructive coronary artery disease, may occur as a result of repetitive coronary spasms.[6] The structure of intercoronary communication is typical of an epicardial coronary artery: it is present in angiographically normal coronary vessels, it has a well-developed muscular layer, with diameters greater than ≥ 1 mm, with extramural characteristics, and is less tortuous when compared with collaterals.[4] It is noteworthy that collateral circulations resemble arterioles, as they have an endothelium supported by poorly organized collagen and muscle fibers.[4] There are contradictory opinions about their functional consequence, since they may present with a protection factor (natural bypass) for ischemia in a coronary artery when there is an obstructive lesion.[1,6] In turn, they may lead to ischemia, due to the coronary steal phenomenon, when it is unidirectional and there is no obstructive lesion.[1,3] The ischemic consequences of one-way flow communication can be explained by their similarity with a coronary artery fistula into a low-pressure territory.[2] Transient coronary flow disturbances can cause typical chest pain and ischemia in functional tests.[6] In these cases, patients treated with beta-blockers or non-dihydropyridine calcium channel antagonists generally show clinical improvement due to vasomotor tonus reduction mechanism.[1]

Funding sources

None declared.

Conflicts of interest

The authors declare no conflicts of interest.

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