

Distal Intercoronary Communication. A Case Report and Medical Literature Review

Juan A. Fournier, José A.P.F. Cortacero, Luis Díaz de la Llera, Ángel Sánchez, Eduardo Arana, and Juan E. Morán

Unidad de Hemodinámica y Cardiología Intervencionista, Servicio de Cardiología, Hospital Universitario Virgen del Rocío, Sevilla, Spain.

Direct connections between normal distal coronary arteries are rarely detected with angiography. In a 67-year-old man a diagnosis of intercoronary arterial continuity was established after ruling out collateral circulation secondary to coronary obstruction. Published reports of similar cases are reviewed.

Key words: *Coronary angiography. Congenital heart defects. Vessels. Imaging.*

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Comunicación intercoronaria distal. Presentación de un caso clínico con revisión de la literatura médica

La intercomunicación distal entre arterias coronarias normales es una observación angiográfica extremadamente rara. Un varón de 67 años de edad fue diagnosticado de conexión intercoronaria distal tras descartar que se tratara de circulación colateral secundaria a la obstrucción de un vaso. Se revisa la bibliografía al respecto.

Palabras clave: *Coronariografía. Defectos cardíacos congénitos. Vasos. Imagen.*

INTRODUCTION

Anastomotic connections between normal coronary arteries have been observed in a number of postmortem angiograms,^{1,2} but they have been found only extremely rarely in living adults. It is estimated that these connections are seen in 0.05% of all diagnostic procedures, which corresponds to one in every 500 otherwise normal coronary angiographs.³ This type of connection between coronary arteries is a congenital malformation which should not be confused with connections belonging to the collateral circulation that develops after obstructive coronary artery disease.

CASE REPORT

A 67-year-old male with no history of ischemic cardiopathy and no known coronary risk factors presented with resting retrosternal chest pain of 30 minutes' duration that did not respond to sublingual nitroglycerin administration. He was referred to our hospital

for further evaluation. A resting electrocardiogram (ECG) demonstrated diffuse non-specific ST segment abnormalities. After admission, the patient had at least 3 further similar episodes, which were of shorter duration. During these episodes, no abnormalities in ventricular repolarisation were observed electrocardiographically. Physical examination and the results of tests for markers of myocardial damage were all normal. The results of exercise testing were within normal limits and a perfusion gammagram after dipyridamole administration was also normal. Despite these findings, the recurrence of chest discomfort consistent with angina pectoris suggested that a coronary angiographic study should be carried out. A left ventriculogram did not demonstrate any segmental anomalies associated with contraction. The ejection fraction was 59%, and the results of left coronary arteriography were normal (Figure 1A). Right coronary arteriography showed a poorly developed vessel that otherwise appeared normal. In this vessel there was a retrograde increase in radiographic image density in the segment distal to the circumflex artery (Figure 1B). Although these findings were not accompanied by chest pain or ECG changes, contralateral spasm was suspected and 200 µg intracoronary nitroglycerin was administered immediately. Repeat left coronary angiography showed no abnormalities. Later, detailed exa-

Correspondence: Dr. J.A. Fournier Andray.
Espinosa y Cárcel, 57, 9B. 41005 Sevilla. España.
E-mail: fournier@supercable.es

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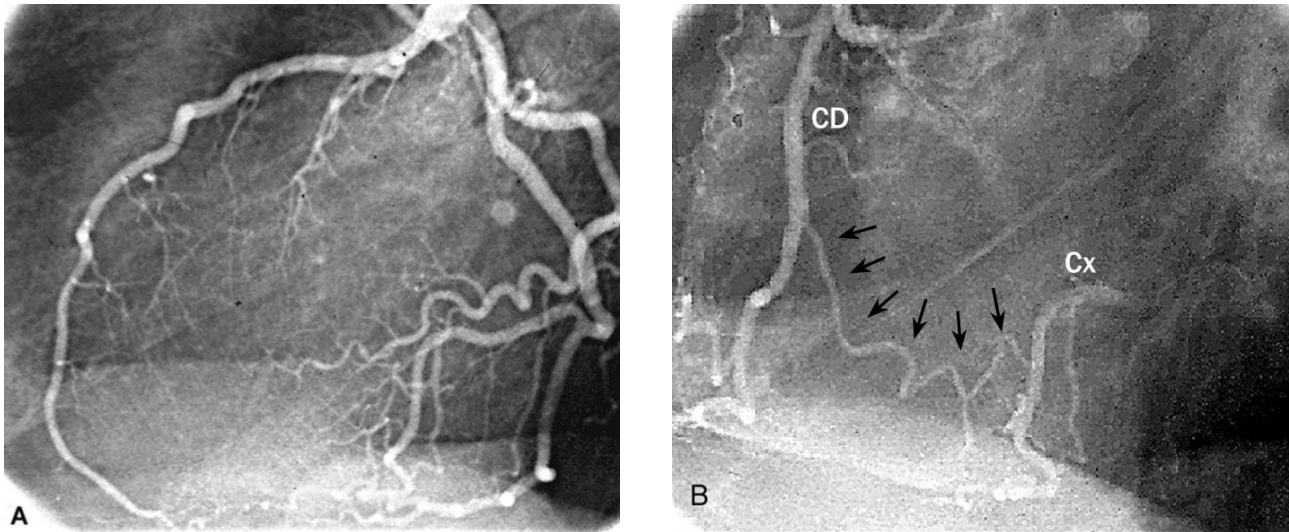


Fig. 1. A: Angiogram of the left coronary artery shown in lateral projection. B: Angiogram of the right coronary artery. The distal segment of the circumflex artery (Cx) fills from the right coronary artery (CD/RA) in a retrograde fashion via a single communicating vessel (arrows) which follows the course of the posterior atrioventricular groove.

mination of the results of the angiographic study identified a connection between the right coronary artery and the circumflex artery which was formed by a single vessel that followed the course of the posterior atrioventricular groove. The patient was reassured that his coronary arteries were normal and he was discharged with a diagnosis of chest discomfort of uncertain etiology.

DISCUSSION

On the basis of postmortem anatomic and angiographic studies, connections between coronary arteries

have been classified as being either part of the collateral circulation or an intercoronary continuity.^{1,2} The collateral circulation is formed by anastomoses between coronary artery segments or branches which develop in the presence of obstructive lesions. An intercoronary continuity is a direct communication between the two main coronary arteries, which can develop in the absence of an obstructive lesion. Intercoronary continuities have been observed anatomically, principally between the circumflex and right coronary arteries—a group of vessels also referred to as the coronary arcade. However, intercoronary continuities have also been seen between posterior and anterior descen-

TABLE 1. Angiographically documented cases of intercoronary continuity occurring in the absence of obstructive lesions

N	Author, year, reference	Age (years)/sex	Anastomosis	Flow*
1	Weiner, 1979 ⁴	56/M	RCA-CXA	Unidirectional
2	Hines, 1981 ³	43/F	RCA-CXA	Bidirectional
3	Kutcher, 1982 ⁵	50/F	RCA-CXA	Bidirectional
4	Esente, 1983 ⁶	56/M	RCA-CXA	Bidirectional
5	Linsenmeyer 1984 ⁷	57/F	RCA-DAA	Unidirectional
6	Burri 1986 ⁸	54/F	RCA-CXA	Bidirectional
7	Celano 1987 ⁹	36/M	RCA-CXA	Unidirectional
8	Voci 1987 ¹⁰	60/M	RCA-CXA	Bidirectional
9	Voci 1987 ¹⁰	44/M	RCA-CXA	Unidirectional
10	Voci 1987 ¹⁰	37/F	RCA-CXA	Unidirectional
11	Lefevre 1989 ¹¹	36/M	RCA-CXA	Unidirectional
12	Greenberg 1989 ¹²	—	RCA-CXA	Bidirectional
13	Carangal 2000 ¹³	55/F	RCA-CXA	Bidirectional
14	Atak 2002 ¹⁴	49/M	RCA-CXA	Unidirectional
15	Fournier 2003	67/M	RCA-CXA	Unidirectional

*The flow direction was always either solely or predominantly from the right to the left artery. RCA indicates right coronary artery; CXA, circumflex artery; DAA, anterior descending artery; M, male; F, female.

ding arteries. The most probable etiological explanation for these intercoronary connections is that they are congenital, due to the persistence of a fetal pattern of coronary circulation.¹⁻³ In 1979, Weiner et al⁴ published a report of the first *in vivo* case documented with angiography. The authors hypothesized that this was the same type of collateral circulation as occurs in the presence of obstructive lesions. However, histologic studies of the vessel wall demonstrated that the communicating vessel was similar in structure to normal coronary arteries and different from collateral vessels, which are more similar in structure to arterioles.^{1,2} In addition, vessels that form intercoronary continuities generally follow a rectilinear epicardiac course, whereas vessels belonging to the collateral circulation are usually tortuous. Awareness of this rare congenital anatomic variation is important, as otherwise coronary angiograms might be misinterpreted. In the present case vasospastic occlusion of the contralateral vessel was initially suspected.

Careful review of the literature revealed that this type of angiographic observation is extremely rare (Table 1).³⁻¹⁴ With the exception of the patient reported by Linsenmeyer et al,⁷ in whom there was a connection between the right posterior interventricular artery and the anterior descending artery, in all other reported patients the intercoronary continuity arose between the circumflex artery and the right coronary artery and was formed by a single vessel that followed the course of the posterior atrioventricular groove. Although coronary artery flow was either unidirectional or bidirectional in these patients, there was always flow from the right to the left coronary artery. The functional significance of this observed flow direction is not known.

Interestingly, chest pain was present in all reported cases but laboratory evidence of ischemia was always inconclusive and the response to sublingual nitroglycerin administration was negative. We speculate that the pain is caused by transitory disturbances in coronary blood flow.

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