

# A coronary fistula in the apical region of the left ventricle as a rare cause of angina pectoris

Piotr Hamala, Jarosław D. Kasprzak, Jan Z. Peruga, Konrad Szymczyk, Karina Wierzbowska-Drabik

Department of Cardiology, Medical University of Lodz, Bieganski Hospital, Łódź, Poland

We report a case of a 63-year-old woman admitted to the Department of Cardiology due to recurrent exercise-related angina. Medical history revealed arterial hypertension, diabetes, hypercholesterolemia, and obesity but no coronary artery disease (CAD). Other cardiovascular risk factors such as smoking and family history of CAD were absent. Laboratory tests showed reduced levels of total cholesterol (108 mg/dl; reference range, 130–200 mg/dl) and low-density lipoprotein cholesterol (41.6 mg/dl; reference range, 45–130 mg/dl) as well as elevated levels of N-terminal fragment of the prohormone brain natriuretic peptide (157.6 pg/ml; reference range, 0–125 pg/ml). Troponin levels were normal. Physical examination and resting electrocardiography did not reveal any significant abnormalities. A stress test showed exercise-induced ventricular extrasystoles and was stopped due to fatigue at 4.6 metabolic equivalents, without ST-segment abnormalities.

Single-photon emission computed tomography (SPECT) showed exercise-induced reversible perfusion defect in the anterolateral wall encompassing 10% of the left ventricular (LV) myocardium. Echocardiography revealed good contractility with an LV ejection fraction of 58%, but during color Doppler examination, untypical turbulent diastolic flow was observed in the apical lateral segment, indicating a blood leak into the LV chamber (FIGURE 1A and 1B). On coronary angiography, fistulas connecting the second diagonal branch with the LV chamber in the apical region were noted (FIGURE 1C). Contrast-enhanced computed tomography angiography was performed to investigate fistula anatomy. It showed a group of thin vessels crossing through the cardiac wall, which originated from the coronary artery system and communicated with the LV chamber. (FIGURE 1D). The site of the perfusion

defect area on SPECT corresponded with the segment of the coronary artery with the presence of fistulas. The underlying pathophysiologic mechanism could be the coronary stealing phenomenon (a reduction of blood flow through the artery, distal to the fistulas). While on medical therapy with nitrates, the patient developed symptoms of Canadian Cardiovascular Society (CCS) class III angina. Nitrate treatment was stopped, but the use of bisoprolol, ramipril, and atorvastatin was continued. Exercise tolerance improved within a few days (CCS class I).

Coronary-ventricle fistulas are observed in 0% to 2% of angiographies.<sup>1</sup> The stealing phenomenon and subsequent ischemic mechanism are related to the pressure gradient between a high-pressure coronary artery and a low-pressure LV during diastole. Some studies postulated an association with myocardial hypertrophy, especially apical hypertrophy.<sup>2</sup> Embryological studies suggested a relationship between fistulas and thebesian veins. Based on the pathophysiologic mechanism, nitrate therapy can decrease coronary perfusion pressure and increase coronary steal, leading to worsening of angina.<sup>3</sup> Fistulas drain into the LV, but other destinations, such as the superior vena cava, are also well documented.<sup>4</sup>

In the literature, the following therapeutic options were proposed: surgical ligation of fistulas, percutaneous intervention, or medical treatment ( $\beta$ -blockers, ranolazine). Nitrate therapy is not recommended.<sup>3</sup>

In our patient, medical treatment resulted in a significant reduction of angina symptoms. As the outcome was satisfactory, the patient was not referred for invasive treatment. If the patient develops symptoms in the future, fractional flow reserve assessment should be considered to extend the diagnostic workup for ischemia.<sup>5</sup>

#### Correspondence to:

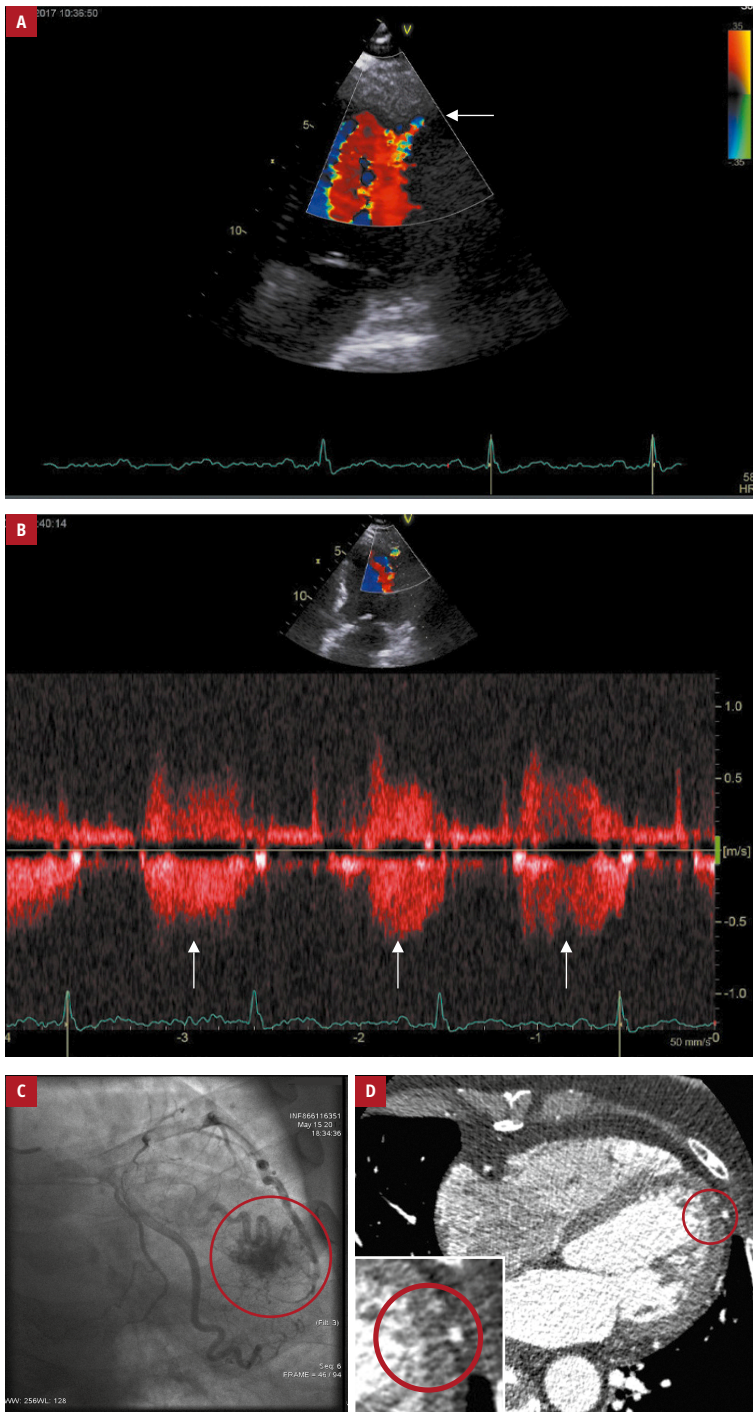
Piotr Hamala, MD,  
Department of Cardiology,  
Medical University of Lodz,  
Bieganski Hospital,  
ul. Kniaziewiczza 1/5, 92-217 Łódź,  
Poland, phone: +48 42 251 62 16,  
email: piotrhamala@gmail.com  
Received: October 12, 2019.

#### Revision accepted:

January 17, 2020.

#### Published online:

January 22, 2020.  
Kardiologia Polska. 2020; 78 (4): 340-341  
doi:10.33963/KP.15151  
Copyright by the Author(s), 2020



**FIGURE 1** **A** – an apical view with color Doppler displaying a narrow inflow (jet) into the left ventricle (arrow); **B** – a pulsed-wave Doppler sampling of the jet, confirming a diastolic flow into the left ventricle (arrows); **C** – coronary angiography showing contrast flow into the left ventricle (circle); **D** – computed tomography angiography showing fistulas connecting the coronary artery with the left ventricle (circle)

## ARTICLE INFORMATION

**CONFLICT OF INTEREST** None declared.

**OPEN ACCESS** This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License (CC BY-NC-ND 4.0), allowing third parties to download articles and share them with others, provided the original work is properly cited, not changed in any way, distributed under the same license, and used for non-commercial purposes only. For commercial use, please contact the journal office at [kardiologiapolska@ptkardio.pl](mailto:kardiologiapolska@ptkardio.pl).

**HOW TO CITE** Hamala P, Kasprzak JD, Peruga JZ, et al. A coronary fistula in the apical part of the left ventricle as a rare cause of angina pectoris. *Kardiol Pol.* 2020; 78: 340-341. doi:10.33963/KP.15151

## REFERENCES

- 1 Black IW, Loo CK, Allan RM. Multiple coronary artery-left ventricular fistulae: clinical, angiographic, and pathologic findings. *Cathet Cardiovasc Diagn.* 1991; 23: 133-135.
- 2 Delarche N, Colle JP. Multiple left coronary-ventricular microfistula and apical hypertrophy. *Arch Mal Coeur Vaiss.* 1993; 86: 75-78.
- 3 Heper G, Kose S. Increased myocardial ischemia during nitrate therapy: caused by multiple coronary artery-left ventricle fistulae? *Tex Heart Inst J.* 2005; 32: 50-52.
- 4 Wichrowska A, Niklas A, Frankiewicz M, et al. Fistula between the right coronary artery and the superior vena cava as a cause of anginal symptoms. *Kardiol Pol.* 2016; 74: 86.
- 5 Samuel H, Aashish G, Shahar L. Is fractional flow reserve useful in assessing coronary artery fistula: a case-based discussion and review. *Heart Lung Circ.* 2019; 28: 51-53.