Folia Cardiologica 2024, 19
DOI: 10.5603/fc.96226
Copyright © 2024 Via Medica
ISSN 2353–7752
e-ISSN 2353–7760

Right coronary artery agenesis

Brak prawej tętnicy wieńcowej

Marcin Gregorczyk[1], Azita Rezaei[1], Piotr Jagodowski[2], Łukasz Gawlik[2], Michał Spałek[3, 4], Łukasz Wypchło[2, 5], Krzysztof Figarski[6], Aneta Jabłońska-Grabda[2, 5]

[1]St. Raphael Provincial Specialist Hospital, Czerwona Góra, Poland
[2]Collegium Medicum, Jan Kochanowski University, Kielce, Poland
[3]Anatomy Department, Collegium Medicum, Jan Kochanowski University, Kielce, Poland
[4]Department of Medical Imaging, Holy Cross Cancer Center, Kielce, Poland
[5]Department of Imaging Diagnostics, Voivodeship Regional Hospital, Kielce, Poland
[6]County Health Care Center in Starachowice — Cardiology Outpatient Clinic, Poland

Abstract

The following study presents a 75-year-old female patient who was admitted to the hospital due to atypical chest pain and paroxysmal dyspnoea. After imaging and laboratory diagnostics, the absence of the right coronary artery (RCA) was confirmed. A solitary coronary artery is a relatively rare congenital anomaly with a not fully understood aetiology. Most patients remain asymptomatic throughout their lives, while some may experience nonspecific symptoms such as chest pain or decreased exercise tolerance. These patients are initially diagnosed with coronary artery disease, which delays the recognition of RCA absence. The gold standard for diagnosing the absence of RCA is cardiac computed tomography (CT). Treatment is primarily conservative, but in cases requiring intervention, surgical treatment is utilized.

Keywords: cardiac computed tomography, CT, absence of the right coronary artery, RCA, SCA

Folia Cardiologica 2024; 19: 48–51

Introduction

Congenital absence of the right coronary artery (RCA) is a fairly rare congenital anomaly that can lead to serious consequences, including death. It can be caused by its agenesis, congenital obstruction during foetal life or be a component of another congenital heart disease [1]. Coronary artery anomalies are often detected incidentally during the examination of patients with complaints of coronary artery disease. Cardiac CT is an excellent tool for differentiating between coronary artery disease and coronary artery anomalies because of its high spatial and contrast resolution [2]. In most cases, the defect is asymptomatic, but some patients may develop more serious complications such as myocardial ischaemia or stable angina with the development of atherosclerosis in the coronary vessels [3].

Address for correspondence: Marcin Gregorczyk, St. Raphael Provincial Specialist Hospital in Czerwona Góra, ul. Jagiellońska 72, 25–734 Kielce, Poland, e-mail: marcin.gregorczyk43@gmail.com

Received: 27.06.2023 Accepted: 20.07.2023 Early publication date: 08.06.2024

This article is available in open access under Creative Common Attribution-Non-Commercial-No Derivatives 4.0 International (CC BY-NC-ND 4.0) license, allowing to download articles and share them with others as long as they credit the authors and the publisher, but without permission to change them in any way or use them commercially.

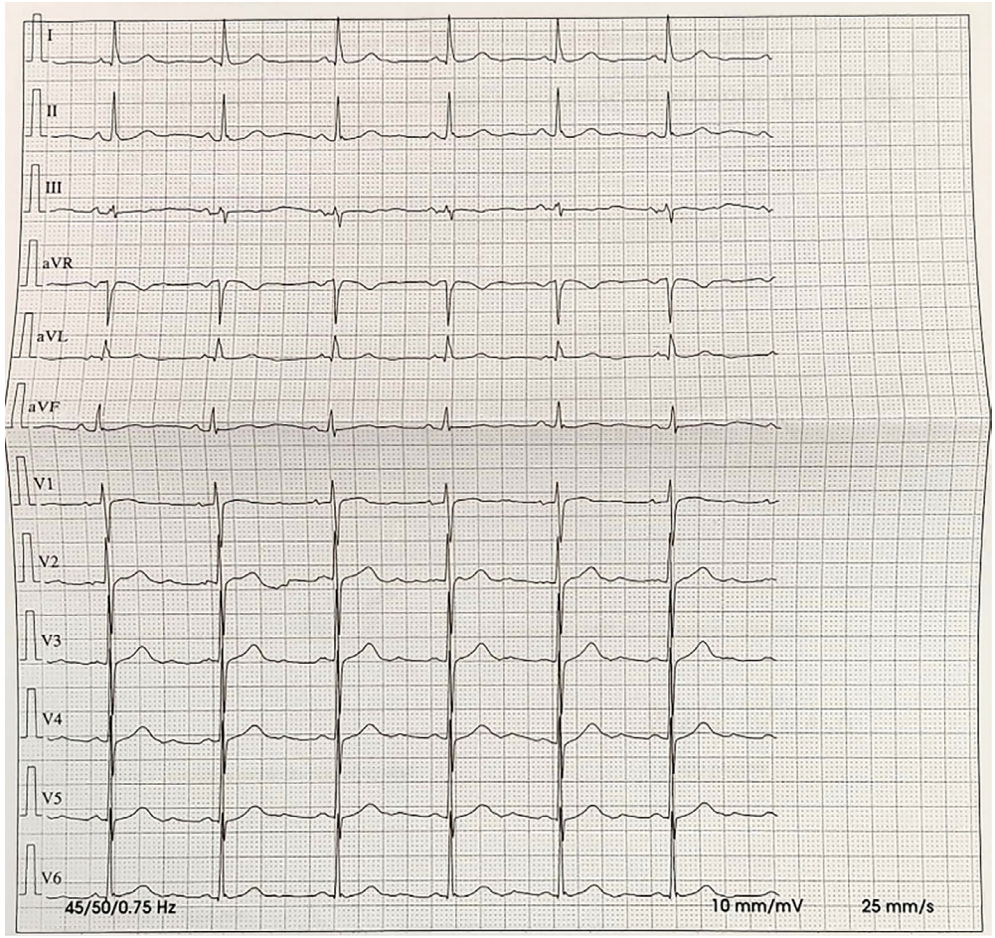

Figure 1. The result of the electrocardiogram of the patient

Case report

A 75-year-old female patient was admitted to the hospital for diagnosis due to atypical left-sided chest pain and paroxysmal dyspnoea. The patient was hospitalised in 2018 for the same symptoms. At that time, a cardiac exercise test was performed on a moving treadmill according to the Bruce protocol. The test was negative and there was low exercise tolerance. An echocardiogram of the heart showed no segmental wall motion abnormalities. Ejection fraction was 60%, mild mitral regurgitation, mild left ventricular diastolic dysfunction and trace pulmonary and tricuspid regurgitation were found. Electrocardiography showed ST-segment depression of more than 1.5 mm in leads III and aVF and non-specific intraventricular conduction abnormalities (Figure 1). The patient was then discharged from the hospital for conservative treatment — acetylsalicylic acid, telmisartan, potassium and rosuvastatin. Subsequently, the patient was under the supervision of a cardiology outpatient clinic.

In 2022, she was referred for a computed tomography (CT) scan of the heart (Figure 2), which described an absent right coronary artery (RCA) and a super-dominant circumflex branch (Cx). The trunk of the left coronary artery (LM) diverges at a typical location from the left aortic sinus. The anterior interventricular branch (LAD) typically diverges from the LM, giving off 3 diagonal branches (Dg), the right ventricular branch (RV) and the conus arteriosus branch (Con). The Cx departs typically from the LM, gives off the marginal branch (OM), posterolateral branch (PL), posterior descending branch (PDA), marginal branch (AM), RV and one of the terminal branches of the SNod, the other terminal branch reaches the area of the right aortic sinus. Single calcified atherosclerotic plaques are present in the Cx, LAD and OM, narrowing the vessel lumen by approximately 20–40%.

The patient is currently under the supervision of a cardiology outpatient clinic, is treated conservatively, reports no complaints and there are no indications for surgical treatment.

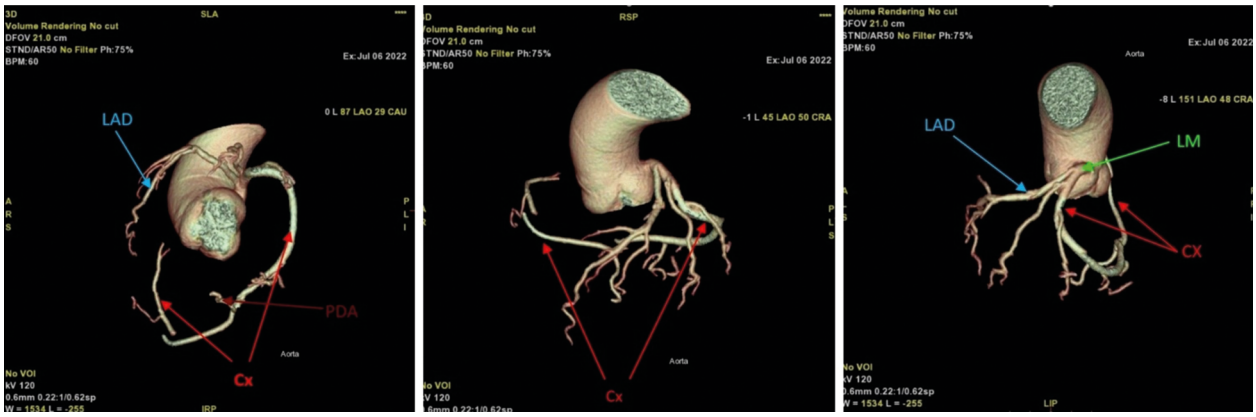

Figure 2. Computed tomography — volumetric reconstruction images

Discussion

Single coronary artery (SCA) is a relatively rare congenital anomaly. Its incidence ranges from 0.014% to 0.066% [2]. Congenital absence of the RCA is a subtype of SCA first described in 1948 by White and Edwards. The mechanism describing the causes of this phenomenon is not fully understood, although it may be related to a defect during foetal development or congenital occlusion of the coronary vessel lumen [4, 5]. The majority of patients with coronary artery anomalies have no symptoms specific to the defect or develop early sudden death [4]. Often patients with right coronary artery agenesis are misdiagnosed with ischaemic heart disease or remain undiagnosed [1]. Consequently, there is no established specific diagnostic protocol for patients with defects of this type [4]. This was the situation in the case of the patient described here, who was completely asymptomatic for most of her life and the absence of a right coronary artery was diagnosed during the diagnosis of ischaemic heart disease at an older age. For the non-invasive diagnosis of coronary artery anomalies, cardiac CT is a very good tool, which also allows three-dimensional reconstructions of the coronary anatomy. Cardiac CT is currently the gold standard for the diagnosis of coronary artery anomalies [4]. There is no standardised procedure for the treatment of SCA. Conservative treatment is mainly based on anticoagulants, statins and blood pressure lowering. In cases that require it, surgical treatment such as pacemaker implantation, coronary revascularisation and others are used [1].

Conclusions

Congenital absence of the coronary artery is a rare condition that may not present with any clinical symptoms as well as non-specific manifestations. The gold standard for the diagnosis of SCA is cardiac computed tomography, which is a non-invasive test that allows accurate imaging of the coronary circulation, detection of any lesions in it and confirmation of the diagnosis.

Additional information

Ethics statement
Not applicable.

Author contributions
Not applicable.

Acknowledgements
None.

Conflict of interest
The authors declare no conflict of interest.

Supplementary material
None.

Funding
None.

Streszczenie

W poniższej pracy przedstawiono przypadek 75-letniej pacjentki, która została przyjęta do szpitala z powodu nietypowego bólu w klatce piersiowej i napadowej duszności. Po wykonanej diagnostyce obrazowej i laboratoryjnej potwierdzono brak prawej tętnicy wieńcowej. Pojedyncza tętnica wieńcowa jest stosunkowo rzadką wadą wrodzoną o nie do końca poznanej etiologii. Większość pacjentów przez całe życie pozostaje bezobjawowa, natomiast u części występują niespecyficzne objawy takie jak: bóle w klatce piersiowej czy obniżenie tolerancji wysiłku fizycznego. Ci pacjenci są w pierwszej kolejności diagnozowani w kierunku choroby niedokrwiennej serca, co opóźnia rozpoznanie braku RCA. Złotym standardem w rozpoznawaniu braku RCA jest tomografia komputerowa serca. Leczenie jest głównie zachowawcze, natomiast w przypadkach tego wymagających stosuje się leczenie operacyjne.

Słowa kluczowe: tomografia komputerowa serca, TK, brak prawej tętnicy wieńcowej, RCA, SCA

Folia Cardiologica 2024; 19: 48–51

References

1. Yan GW, Bhetuwal A, Yang GQ, et al. Congenital absence of the right coronary artery: A case report and literature review. Medicine (Baltimore). 2018; 97(12): e0187, doi: 10.1097/MD.0000000000010187, indexed in Pubmed: 29561437.
2. Forte E, Punzo B, Agrusta M, et al. A case report of right coronary artery agenesis diagnosed by computed tomography coronary angiography. Medicine (Baltimore). 2020; 99(7): e19176, doi: 10.1097/MD.0000000000019176, indexed in Pubmed: 32049849.
3. Malik MB, Zeltser R. Isolated Coronary Artery Anomalies. 2022 Jul 24. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan–. , indexed in Pubmed: 32310434.
4. Le Moigne F, Genicon C. Right Coronary Artery Agenesis with Superdominant Left Circumflex Artery Diagnosed by CT Angiography. Turk Kardiyol Dern Ars. 2022; 50(5): 395–396, doi: 10.5543/tkda.2022.22431, indexed in Pubmed: 35860892.
5. Chen Z, Yan J, Han X, et al. Congenital absence of the right coronary artery with acute myocardial infarction: report of two cases and review of the literature. J Int Med Res. 2020; 48(12): 300060520971508, doi: 10.1177/0300060520971508, indexed in Pubmed: 33275472.