

# C like COVID-19: cardiovascular complications in a young patient

## C jak COVID-19 – powikłania układu sercowo-naczyniowego u młodego pacjenta

Daria Kaczmarek , Robert Morawiec, Katarzyna Piestrzeniewicz, Jarosław Drożdż

II Department of Cardiology, Chair of Cardiology, Cardiac Surgery and Vascular Diseases, Medical University of Lodz, Łódź, Poland

### Abstract

The authors present the case of a 27-year-old patient with cardiovascular complications after undergoing severe acute respiratory syndrome-related coronavirus 2 infection. The first symptoms included muscle aches and somnolence, severe sore throat, and enlargement of submandibular and cervical lymph nodes, followed by dyspnoea and chest pain with body temperature 37.5 °C. Because of the medical profession, the patient underwent a routine reverse-transcription polymerase chain reaction test for coronavirus infection, which was positive, before returning to work. In an electrocardiogram, it was observed pathological Q waves in II, III, aVF, V6, and 1 mm of ST elevation in V1–V3. The laboratory tests showed normal levels of cardiac troponin T, creatine kinase MB fraction, and N-terminal pro-B-type natriuretic peptide. Transthoracic echocardiography revealed the hypokinesis of the middle and apical segment of the anterior and lateral wall with preserved left ventricular ejection fraction (LVEF) – 54%. The magnetic resonance imaging (MRI) revealed the normal volume and global left ventricular systolic function (LVEF 52%) with segmental wall motion abnormalities. Subepicardial banded foci of late gadolinium enhancement (LGE), located in the lower right and left ventricular segments of the basal, central and apical segments of the inferior wall suggested inflammatory aetiology of changes found. It may be assumed that the suspected myocarditis was caused by coronavirus disease 2019 (COVID-19) infection. Since LGE was present in the inferior wall, the patient may be considered having a low risk of major cardiac events and heart failure hospitalizations, referring to the ITAMY study. In patients without a history of cardiovascular diseases with COVID-19, cardiac MRI may reveal preserved, mid-range, or reduced LVEF. The patient requires further follow-up. The coronavirus is the most dangerous for the elderly, but it can also affect the hearts of otherwise healthy people, including young adolescents.

Key words: coronavirus, COVID-19, myocarditis, late gadolinium enhancement

Folia Cardiologica 2020; 15, 6: 433–436

### Introduction

On January 7<sup>th</sup> 2020, the novel type of coronavirus was isolated by the Chinese scientist [1]. Since the first reported case from China on December 31<sup>st</sup> 2019, the virus has spread worldwide. Although coronavirus causes symptoms mainly related to the respiratory system called coronavirus

disease 2019 (COVID-19), current reports of its harmful effects on the cardiovascular system are becoming more common. In some cases, the virus may affect the heart without respiratory symptoms [2].

We present the case of a young patient with cardiovascular complications after the severe acute respiratory syndrome-related coronavirus 2 (SARS-CoV-2) infection.

Address for correspondence: lek. Daria Kaczmarek, II Klinika Kardiologii, Uniwersytet Medyczny w Łodzi, ul. Pomorska 251, 92–213 Łódź, Poland, phone +48 42 201 43 16, e-mail: dariaa.jedrzejewska@gmail.com

## Case report

A 27-year-old male, medical doctor, with bronchial asthma was diagnosed with tonsillitis and treated with clindamycin. The first symptoms included muscle aches and somnolence, severe sore throat, and enlargement of submandibular and cervical lymph nodes, followed by dyspnoea and chest pain with body temperature 37.5 °C. On subsequent days, most severe symptoms relieved, but general malaise and deterioration of exercise tolerance were constantly present and occasionally accompanied by chest pain and heart palpitations. Before returning to work, the patient underwent a routine reverse-transcription polymerase chain reaction (RT-PCR) test for coronavirus infection, which was positive. After the following 14 days, no additional symptoms were observed, but all the above-mentioned cardiovascular symptoms were still present. He underwent routine tests before returning to work, including RT-PCR test (negative) and an electrocardiogram (ECG), which revealed pathological Q waves in II, III, aVF, V6, and 1 mm of ST elevation in V1–V3 (Figure 1). The following laboratory tests showed normal levels of cardiac troponin T, creatine kinase MB fraction, and N-terminal pro-B-type natriuretic peptide. Transthoracic

echocardiography (TTE) revealed the hypokinesis of the middle and apical segment of the anterior and lateral wall with preserved left ventricular ejection fraction (LVEF) – 54% and normal right ventricle systolic function without relevant valvular dysfunctions. The magnetic resonance imaging (MRI) revealed the normal volume and global left ventricular systolic function (LVEF 52%) with segmental wall motion abnormalities. Subepicardial banded foci of late gadolinium enhancement (LGE), located in the lower right and left ventricular segments of the basal, central and apical segments of the inferior wall suggested inflammatory aetiology of changes found (Figure 2A). Furthermore, MRI showed no features of inflammatory process activity or myocardial oedema in the T2-weight sequence (Figure 2B). A small dose of beta-blocker was included once a day (1.25 mg of bisoprolol).

## Discussion

Myocarditis is a well-known disease often underdiagnosed which can cause heart failure, sudden cardiac death and also rarer dilated cardiomyopathy [3]. The causes of myocarditis may be different like viral and bacterial infections, autoimmune diseases, certain drugs and toxins.

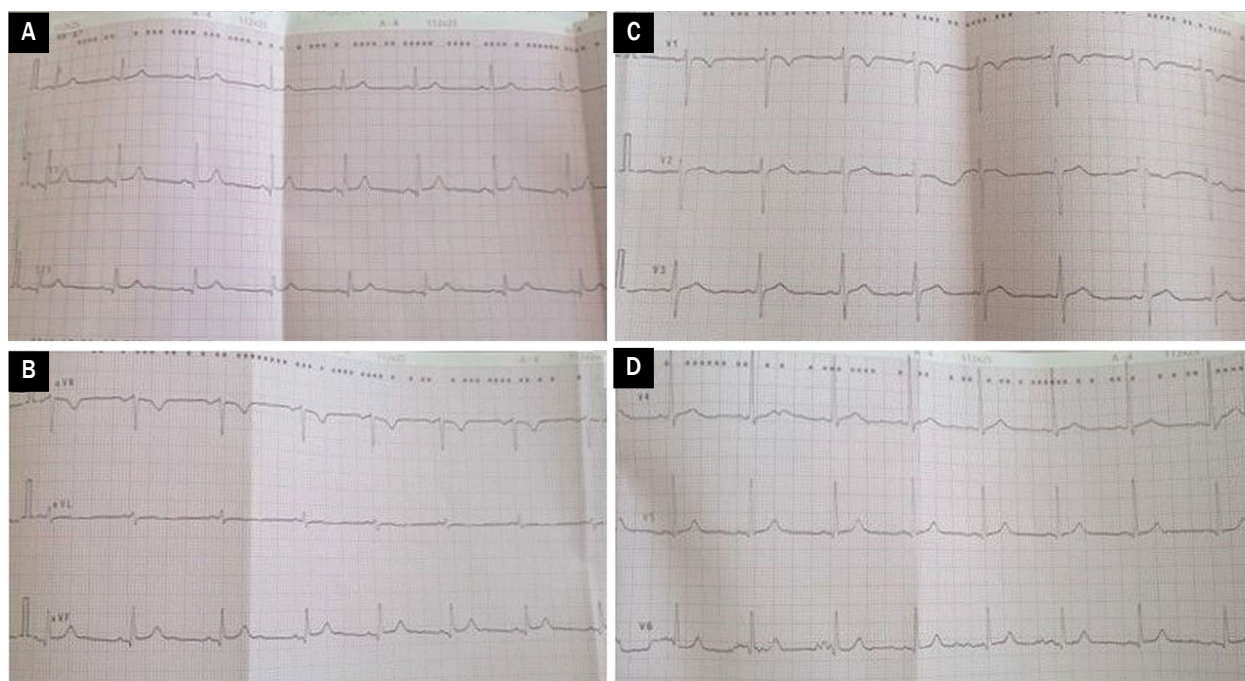
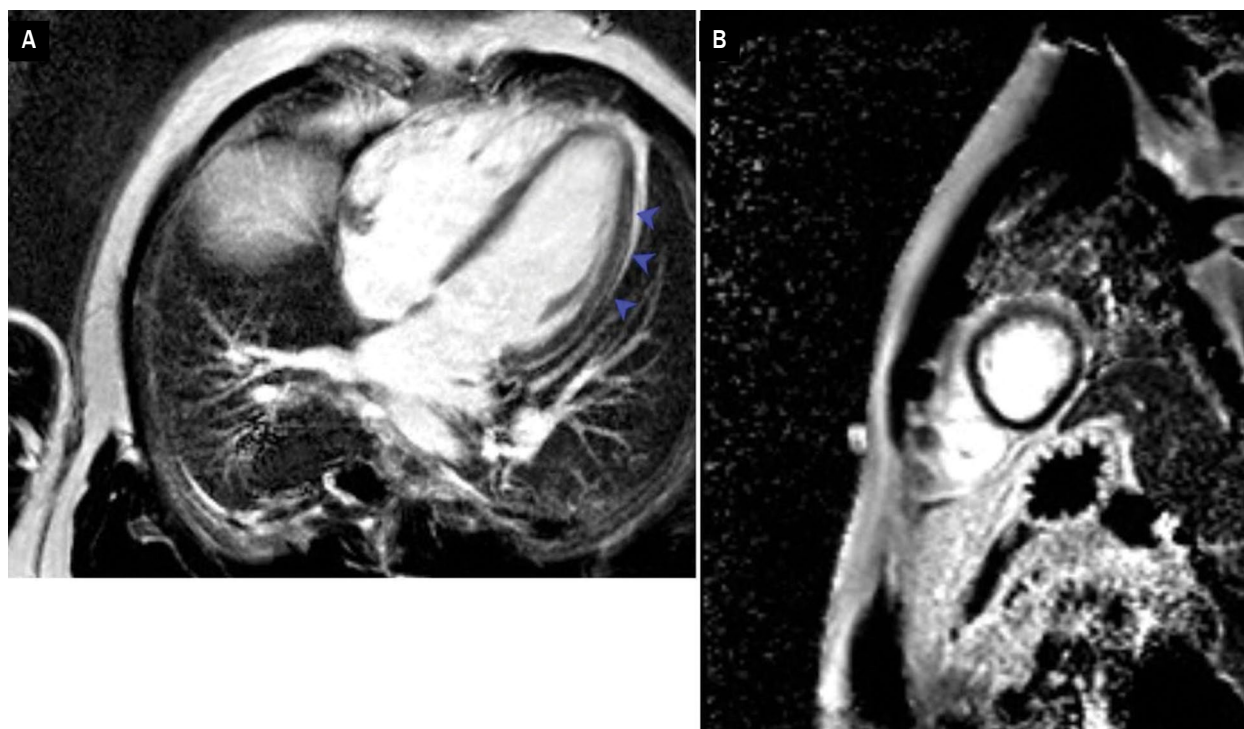


Figure 1A–D. Electrocardiography – revealed pathological Q waves in II, III, aVF, V6 and 1 mm of ST elevation in V1–V3



**Figure 2A.** Late gadolinium enhancement in four-chamber; **B.** The T2-weight sequence in a short-axis view: no features of inflammatory process activity or myocardial oedema

The symptoms are not always characteristic and, in some patients, cardiac MRI can confirm the diagnosis and help determine how to proceed.

In patients without a history of cardiovascular diseases (CVD) with COVID-19, cardiac MRI may reveal preserved, mid-range, or reduced LVEF [4]. There are also some reports regarding acute myocarditis in the course of SARS-CoV-2 infection [5].

It remains to be seen, in the nearest future, whether the coronavirus often gives changes in the cardiovascular system and a tendency to include the heart in the inflammatory process should be expected, as in the case of the B19 parvovirus or the influenza virus.

## Conclusions

To sum up, it may be assumed that the suspected myocarditis was caused by COVID-19 infection. However, it cannot be conclusively proven since other reasons of myocarditis were not entirely excluded. Nevertheless, clinical symptoms and ECG abnormalities with confirmed LGE in MRI are

in temporal association with COVID-19 infection recovery. Since LGE was present in the inferior wall, the patient may be considered having a low risk of major cardiac events and heart failure hospitalizations, referring to the ITAMY study [6]. However, the patient requires further follow-up.

Although the coronavirus is the most dangerous for the elderly, it can also affect the hearts of otherwise healthy people, including young adolescents. Moreover, there is still no effective specific treatment for COVID-19. The patient, potentially recovered from COVID-19 infection, is not an isolated case of myocardial involvement. Further studies are still needed to establish the SARS-CoV-2 impact on the cardiovascular system.

## Acknowledgements

None.

## Conflict of interest

The authors declare no conflict of interests.

## Streszczenie

Zaprezentowano opis przypadku 27-letniego pacjenta z powikłaniami sercowo-naczyniowymi po przebytych zakażeniu SARS-CoV-2 (*severe acute respiratory syndrome-related coronavirus 2*). Pierwsze objawy obejmowały bóle mięśni i senność, silny ból gardła, powiększenie podżuchwowych i szyjnych węzłów chłonnych, a następnie duszność i ból w klatce piersiowej z temperaturą ciała 37,5 °C. Ze względu na wykonywany zawód medyczny, przed powrotem do pracy chory poddał się rutynowemu testowi reakcji łańcuchowej polimerazy z odwrotną transkrypcją w kierunku zakażenia koronawirusem, którego wynik był pozytywny. W elektrokardiogramie obserwowano patologiczne załamki Q w odprowadzeniach II, III, aVF i V6 oraz uniesienia odcinka ST w odprowadzeniach V1–V3 o 1 mm. W badaniach laboratoryjnych stwierdzono prawidłowe stężenia troponiny T, frakcji MB kinazy kreatynowej oraz N-końcowego fragmentu propeptydu natriuretycznego typu B. W przekłatkowym badaniu echokardiograficznym uwidoczono hipokinezę środkowego i koniuszkowego segmentu ścian przedniej i bocznej z zachowaną frakcją wyrzutową lewej komory (LVEF) – 54%. W rezonansie magnetycznym (MRI) stwierdzono prawidłową objętość i globalną funkcję skurczową lewej komory (LVEF 52%) z odcinkowymi zaburzeniami kurczliwości. Podnasierdziowe pasmowate ogniska późnego wzmocnienia pokontrastowego (LGE), zlokalizowane w dolnych segmentach połączenia prawej i lewej komory w segmentach podstawnym, środkowym i koniuszkowym, sugerowały zapalną etiologię stwierdzonych zmian. Można przypuszczać, że przyczyną zapalenia mięśnia sercowego było zakażenie COVID-19 (*coronavirus disease 2019*). Ze względu na obecność LGE w ścianie dolnej uznano, że chorego cechuje niskie ryzyko wystąpienia poważnych zdarzeń sercowo-naczyniowych i hospitalizacji z powodu niewydolności serca, powołując się na badanie ITAMY. U chorych, u których dotychczas nie występowały choroby układu sercowo-naczyniowego, a przebyli COVID-19, MRI serca może ujawnić zachowaną, pośrednią lub obniżoną LVEF. Opisany przypadek wymaga dalszej obserwacji. Koronawirus jest najbardziej niebezpieczny dla osób w podeszłym wieku, ale może również wpływać na serca praktycznie zdrowych osób, w tym młodych dorosłych.

Słowa kluczowe: koronawirus, COVID-19, zapalenie mięśnia sercowego, późne wzmocnienie pokontrastowe

Folia Cardiologica 2020; 15, 6: 433–436

## References

1. World Health Organisation. Novel Coronavirus – China. <https://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en/> (January 12, 2020).
2. Inciardi RM, Lupi L, Zaccone G, et al. Cardiac involvement in a patient with coronavirus disease 2019 (COVID-19). *JAMA Cardiol.* 2020; 5(7): 819–824, doi: [10.1001/jamacardio.2020.1096](https://doi.org/10.1001/jamacardio.2020.1096), indexed in Pubmed: [32219357](https://pubmed.ncbi.nlm.nih.gov/32219357/).
3. Sandeep S, Liu PP, Cooper Jr LT. Myocarditis. *Lancet.* 2012; 379(9817): 738–747, doi: [10.1016/S0140-6736\(11\)60648-X](https://doi.org/10.1016/S0140-6736(11)60648-X), indexed in Pubmed: [22185868](https://pubmed.ncbi.nlm.nih.gov/22185868/).
4. Luetkens JA, Isaak A, Zimmer S, et al. Diffuse myocardial inflammation in COVID-19 associated myocarditis detected by multiparametric cardiac magnetic resonance imaging. *Circ Cardiovasc Imaging.* 2020; 13(5): e010897, doi: [10.1161/CIRCIMAGING.120.010897](https://doi.org/10.1161/CIRCIMAGING.120.010897), indexed in Pubmed: [32397816](https://pubmed.ncbi.nlm.nih.gov/32397816/).
5. Sala S, Peretto G, Gramegna M, et al. Acute myocarditis presenting as a reverse Tako-Tsubo syndrome in a patient with SARS-CoV-2 respiratory infection. *Eur Heart J.* 2020; 41(19): 1861–1862, doi: [10.1093/eurheartj/ehaa286](https://doi.org/10.1093/eurheartj/ehaa286), indexed in Pubmed: [32267502](https://pubmed.ncbi.nlm.nih.gov/32267502/).
6. Aquaro GD, Perfetti M, Camastra G, et al. Cardiac Magnetic Resonance Working Group of the Italian Society of Cardiology. Cardiac MR with late gadolinium enhancement in acute myocarditis with preserved systolic function: ITAMY study. *J Am Coll Cardiol.* 2017; 70(16): 1977–1987, doi: [10.1016/j.jacc.2017.08.044](https://doi.org/10.1016/j.jacc.2017.08.044), indexed in Pubmed: [29025554](https://pubmed.ncbi.nlm.nih.gov/29025554/).