

Impact of the COVID-19 pandemic on the epidemiology of myocardial infarction with nonobstructive coronary arteries

Giovanni Peretto^{1,2}

¹ Myocarditis Disease Unit, Department of Cardiac Electrophysiology and Arrhythmology, IRCCS San Raffaele Scientific Institute, Milan, Italy

² School of Medicine, Vita-Salute San Raffaele University, Milan, Italy

RELATED ARTICLE

by Bil et al

Myocardial infarction with nonobstructive coronary arteries (MINOCA) is a challenging hot topic in modern cardiology. In 2017, the guidelines of the European Society of Cardiology (ESC) defined MINOCA as an acute clinical presentation (1) meeting the classic criteria for acute myocardial infarction (AMI) but (2) showing no coronary artery stenosis greater than or equal to 50% in epicardial vessels, and (3) occurring in the absence of a manifest alternative cause.¹ From this perspective, MINOCA was more of a “working diagnosis,” and the definition was far from identifying the underlying etiology. Recanalization of epicardial vessels, embolic events, coronary microvascular dysfunction, myocardial diseases, and even extracardiac conditions were only a few main differential diagnoses within the broad spectrum of MINOCA. In this setting, while cardiac magnetic resonance has been proposed as an examination tool with a valuable diagnostic and prognostic significance,² it has been reported that the term MINOCA as such did not provide grounds for any actionable decision making in clinical practice.³ In 2018, narrower criteria were introduced by the ESC to define MINOCA.⁴ Particularly, in keeping with the fourth universal definition of AMI, it was required that any myocardial injury (ie, troponin release) had proven ischemic origin to meet the diagnostic criteria of MINOCA. Subsequently, nonischemic diseases, such as myocarditis, were excluded from the MINOCA spectrum in favor of thromboembolic mechanisms. Soon after the outbreak of the COVID-19 pandemic, cardiovascular complications of SARS-CoV-2 infection were described, including thromboembolic events and myocardial inflammation.⁵

In this context, in the latest issue of *Polish Archives of Internal Medicine*, Bil et al⁶ presented the results of a nation-wide study aimed to compare the clinical presentations and outcomes of

patients with MINOCA in Poland, before and during the COVID-19 pandemic. The authors found a relative decrease in the prevalence of MINOCA, from 6.3% in 2019 to 5.9% in 2020. Remarkably, most of the baseline clinical features, including the electrocardiographic pattern at presentation, age, and major comorbidities, such as diabetes, renal failure, peripheral artery disease, and heart failure, were comparable between the groups. Only hypercholesterolemia was found more often before the pandemic. Patients with prior revascularization secondary to known coronary artery disease were excluded from this study. Although statistically insignificant, a trend toward increased all-cause mortality by 12 months was recorded after the COVID-19 outbreak (11% vs 9.2% before COVID-19; $P = 0.09$). In addition, while the rates of other short-term complications were similar, in-hospital stroke was more frequent during the pandemic. Remarkably, the groups did not differ in terms of the history of atrial fibrillation. While no cause-effect relationships can be derived from this study, the COVID-19 pandemic may have contributed to a relative increase in the frequency of embolic events.

Beyond any causal role of SARS-CoV-2, there are 2 relevant points that emerge from the study presented by Bil et al.⁶ The first point concerns the MINOCA diagnosis. Although not explicitly mentioned in the paper, the apparent reduction in the MINOCA incidence likely reflects a better patient selection, resulting from the exclusion of COVID-19-associated myocarditis as a relevant differential diagnosis.^{7,8} Even at the very beginning of the pandemic, a call for appropriate diagnostic workup was made to differentiate MINOCA from myocarditis.⁹ While patients with a high clinical suspicion of AMI were rapidly sent to the catheterization laboratory, most patients with infarct-like presentation of myocarditis more

Correspondence to:
Giovanni Peretto, MD, Department
of Cardiac Electrophysiology
and Arrhythmology, IRCCS San
Raffaele Scientific Institute, via
Olgettina 60, 20132 Milan, Italy,
phone: +39 02 2643 7340,
email: peretto.giovanni@hsr.it
Received: January 20, 2023.
Accepted: January 11, 2023.
Published online: May 23, 2023.
Pol Arch Intern Med. 2023;
133 (5): 16503
doi:10.20452/pamw.16503
Copyright by the Author(s), 2023

likely underwent noninvasive workup, including cardiac magnetic resonance.¹⁰

The second relevant point is related to treatment. While most patients were discharged on aspirin (85.6%, comparable before and during the pandemic), a relative reduction in the use of P2Y₁₂ inhibitors was observed (increase from 52% to 48%; $P = 0.02$) in favor of anticoagulants (from 13% to 15%; $P = 0.17$). These data point to an unmeasured trend toward an increase in thromboembolic etiologies rather than classic nonobstructive atherosclerotic disease, which is in keeping with the epidemiologic data from the COVID-19 era.⁵

The study by Bil et al⁶ has some limitations, mainly related to the retrospective design and the restricted timeframe of enrollment (2 years, including patients recruited before and during the pandemic). Most importantly, no efforts were made to deeply characterize the etiology of MINOCA, and to identify subgroups with distinct diagnostic and prognostic features. On the other hand, the sample size was notable (3178 MINOCA patients from 141 hospitals), and a common data source (the PL-ACS registry) was available with a satisfactory amount of clinically-relevant data.

Evidence from larger multicenter studies with a longer follow-up are needed to provide additional evidence in the complex and dynamic field of MINOCA.

ARTICLE INFORMATION

DISCLAIMER The opinions expressed by the author(s) are not necessarily those of the journal editors, Polish Society of Internal Medicine, or publisher.

CONFLICT OF INTEREST None declared.

OPEN ACCESS This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License (CC BY-NC-SA 4.0), allowing third parties to copy and redistribute the material in any medium or format and to remix, transform, and build upon the material, provided the original work is properly cited, distributed under the same license, and used for noncommercial purposes only. For commercial use, please contact the journal office at pamw@mp.pl.

HOW TO CITE Peretto G. Impact of the COVID-19 pandemic on the epidemiology of myocardial infarction with nonobstructive coronary arteries. *Pol Arch Intern Med.* 2023; 133: 16503. doi:10.20452/pamw.16503

REFERENCES

- 1 Ibanez B, James S, Agewall S, et al. 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: the Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Society of Cardiology (ESC). *Eur Heart J.* 2018; 39: 119-177.
- 2 Dastidar AG, Baritussio A, De Garate E, et al. Prognostic role of CMR and conventional risk factors in myocardial infarction with nonobstructed coronary arteries. *JACC Cardiovasc Imaging.* 2019; 12: 1973-1982. [↗](#)
- 3 Pelliccia F, Marzilli M, Boden WE, Camici PG. Why the term MINOCA does not provide conceptual clarity for actionable decision-making in patients with myocardial infarction with no obstructive coronary artery disease. *J Clin Med.* 2021; 10: 4630. [↗](#)
- 4 Thygesen K, Alpert JS, Jaffe AS, et al; ESC Scientific Document Group. Fourth universal definition of myocardial infarction (2018). *Eur Heart J.* 2019; 40: 237-269.
- 5 Hendren NS, Drazner MH, Bozkurt B, Cooper LT Jr. Description and proposed management of the acute COVID-19 cardiovascular syndrome. *Circulation.* 2020; 141: 1903-1914. [↗](#)
- 6 Bil J, Kern A, Bujak K, et al. Clinical characteristics and 12-month outcomes in MINOCA patients before and during the COVID-19 pandemic. *Pol Arch Intern Med.* 2023; 133: 16405. [↗](#)
- 7 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: 1861-1862. [↗](#)

8 Ammirati E, Lupi L, Palazzini M, et al. Prevalence, characteristics, and outcomes of COVID-19-associated acute myocarditis. *Circulation.* 2022; 145: 1123-1139.

9 Peretto G, Sala S, Caforio ALP. Acute myocardial injury, MINOCA, or myocarditis? Improving characterization of coronavirus-associated myocardial involvement. *Eur Heart J.* 2020; 41: 2124-2125. [↗](#)

10 Peretto G, Villatore A, Rizzo S, et al. The spectrum of COVID-19-associated myocarditis: a patient-tailored multidisciplinary approach. *J Clin Med.* 2021; 10: 1974. [↗](#)