

Coronavirus and cardiovascular complications

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Abstract

Patients with cardiovascular risk factors or established cardiovascular disease represent a vulnerable population when suffering from COVID-19 disease. In this paper, we provide a brief overview of current knowledge on the impact of COVID-19 on the cardiovascular system and more importantly on the outcome of cardiovascular patients as well as a review of the contemporary literature. Key-words: COVID-19, cardiovascular complications

Using the available literature, which is updating from hour by hour and is published in a special way, as well as guidelines dedicated to this topic, the Cardiology Society of Serbia gave special attention to the cardiac consequences of coronavirus infection.

This is the third time in the last 2 decades that coronavirus has led to pandemic levels of infection in humans. In 2003, it was so-called "SARS-CoV" - a severe acute respiratory syndrome with a mortality rate of 9-11%¹. In 2012, the Middle East respiratory syndrome coronavirus - "MERS-CoV", had a mortality rate of 34%¹. The current coronavirus-induced pandemic has been officially named "Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)", or COVID-19, by the World Health Organization (WHO)².

The prevalence of COVID-19 is enormous and is currently registered in 185 countries. The mortality rate varies from 1 to 12%, and most often around 4-6%^{1,2}. At the moment, the mortality rate in Serbia is 2.1% and depends on the number of infected people and the extent of testing for the presence of the virus.

The largest percentage of patients do not have any clinical symptoms or have very mild flu-like symptoms (about 80% of all infected). In more serious forms, COVID-19 is manifested by an infection of the lower respiratory tract (so-called "virus-induced interstitial pneumonia"). Today, it is evident that COVID-19 can damage and has significant consequences for the cardiovascular system².

COVID-19 and cardiovascular disease

Based on scientific reports from China from January 2020, it is estimated that about 40% of patients with COVID-19 have a previous cardiovascular disease³.

On the other hand, COVID-19 infection itself can cause direct damage to various cardiac structures including causing various forms of arrhythmias (16.7%), acute coronary syndrome 7.2%, or myocarditis, which is manifested by an increase in the concentration of highly sensitive cardiac troponin I⁴. Chest pain, palpitations, acute heart failure or cardiac arrest have been described as isolated cases^{3,4}.

Relationship of COVID-19 with renin-angiotensin system inhibitors - angiotensin converting enzyme inhibitors (ACE-I) or angiotensin receptor blockers (ARB).

Based on currently available data and demonstrated evidence of efficacy of these drug groups in cardiovascular patients, ACE-I and ARBs therapy should be continued or initiated in patients with heart failure, hypertension or myocardial infarction in accordance with current guidelines, regardless of COVID-19⁵⁻⁷.

Key messages

COVID-19 Clinical recommendations

Current clinical condition COVID-19

- The overall death rate from COVID-19 based on published reports remains low and currently stands at 2.1% in Serbia. Worldwide, this percentage varies from 1 to 12%.
- More than 80% of infected patients have no or mild symptoms and recover without intensive medical intervention. However, according to large official reports, morbidity and mortality increase significantly with age, increasing to 8.0% in patients between 70 and 79 years of age, and 14.8% in patients older than 80 years.
- Mortality rates of patients with COVID-19 and comorbidities are significantly higher than the average population:
 - Malignancy: 5.6%
 - Hypertension: 6.0%
 - Chronic respiratory disease: 6.3%
 - Diabetes: 7.3%
 - Cardiovascular diseases: 10.5%

Acute cardiac complications COVID-19

- The incidence of heart complications in patients hospitalized for COVID-19 is: 16.7% for arrhythmias, 7.2% for acute coronary syndrome.
- Isolated cases have been reported indicating a rare possibility of acute heart failure, myocarditis and cardiac arrest; as with any acute illness, a higher cardiometabolic requirement may induce cardiac complications.

COVID-19 implications for patients with cardiovascular disease

- Patients with pre-existing cardiovascular disease have a higher risk of COVID-19 infection and have a poorer prognosis.
- All cardiovascular patients at increased risk should be advised to take additional precautions in accordance with general and specific guidelines at the time of the pandemic. When it comes to the use of certain groups of drugs that are controversial at the time of the COVID-19 pandemic, the views at the moment are as follows:
 - If patients tolerate ACE inhibitors well, there is no scientific evidence or reason to discontinue their recommended therapy.
 - The use of non-steroidal anti-inflammatory drugs (ibuprofen), as a modulator of the prostaglandin response to inflammation, also has insufficient scientific evidence for discontinuation of this type of drug in patients with COVID-19, although most physicians do so based on non-randomized studies and reports.
 - The use of chloroquine or hydroxy-chloroquine for preventive purposes and without a doctor's supervision is absolutely contraindicated; these drugs are prescribed only in hospital conditions under strict medical supervision due to possible side effects (serious cardiac arrhythmias).
 - Treatment of patients with COVID-19 and cardiovascular, endocrinological, respiratory, renal, oncological or other comorbid conditions, which require priority treatment, should be in accordance with current good clinical practice.
- General immune health remains of paramount importance to medical staff and patients, including good nutrition, sleep, and stress avoidance.

Application of standard precautions during the COVID-19 epidemic in the treatment of cardiac patients

- The Institute of Public Health of Serbia "Dr Milan Jovanović Batut" has issued an expert-methodological instruction for controlling the introduction and prevention of the spread of the new coronary virus SARS-CoV-2 in the Republic of Serbia
- Protocols for the treatment of patients with acute coronary syndrome (acute myocardial infarction or unstable angina pectoris) in the context of the COVID-19 epidemic, both for patients diagnosed with COVID-19 and without it, have been specially developed and applied in everyday clinical practice. In each individual case, the risk-benefit ratio of the intervention in patients with acute coronary syndrome as well as the risk of nosocomial infection should be assessed.

References

1. Munster VJ, Koopmans M, van Doremalen N, et al. A novel coronavirus emerging in China—key questions for impact assessment. *N Engl J Med* 2020;382:692–694.
2. Zheng YY, Ma YT, Zhang JY, et al. COVID-19 and the cardiovascular system. *Nat Rev Cardiol* 2020;17:259–260.
3. Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet* 2020; 395(10223):507–513.
4. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus infected pneumonia in Wuhan, China. *JAMA* 2020;323:1061–1069.
5. Reynolds HR, Adhikari S, Pulgarin C, et al. Renin-angiotensin-aldosterone system inhibitors and risk of covid-19. *N Engl J Med*. 2020 May 1;NEJMoa2008975. doi: 10.1056/NEJMoa2008975. Online ahead of print.
6. Mancia G, Rea F, Ludergnani M, et al. Renin-angiotensin-aldosterone system blockers and the risk of covid-19. *N Engl J Med*. 2020 May 1;NEJMoa2006923. doi: 10.1056/NEJMoa2006923. Online ahead of print.
7. European Society of Cardiology. ESC guidance for the diagnosis and management of CV disease during the COVID-19 pandemic. 2020. <https://www.escardio.org/Education/COVID-19-and-Cardiology/ESC-COVID-19-Guidance>.

Sažetak

Koronavirus i kardiovaskularne komplikacije

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Pacijenti sa kardiovaskularnim faktorima rizika ili utvrđenim kardiovaskularnim bolestima predstavljaju ranjivu populaciju kada boluju od COVID-19 oboljenja. U ovom radu dajemo sažet pregled trenutnih saznanja o uticaju COVID 19 na kardiovaskularni sistem i jos vaznije na ishod lecenja kod kardiovaskularnih bolensika kao i pregled savremene literature.

Cljučne reči: COVID 19, kardiovaskularne komplikacije