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## Comment on: “Myocarditis, paraparesia and ARDS associated to COVID-19 infection”



We read the case report by Jeantin et al.<sup>1</sup> entitled “Myocarditis, paraparesia and ARDS associated to COVID-19 infection” with great interest. Although it is a very interesting and educational case report, we want to address some points that merit more attention.

COVID-19 is a disease that affects many systems and organs and requires a multidisciplinary approach.<sup>2,3</sup> Although it is known that the prognosis is worse and the disease is more severe in the elderly and those with chronic diseases, as we have seen in this case, poor prognosis can also be seen in patients without known risk factors.<sup>1,4</sup> COVID-19 is a disease that increases the risk of thrombosis and can have cardiovascular effects such as myocardial damage, myocarditis, acute myocardial infarction, heart failure, arrhythmia.<sup>2,5–7</sup> In this case, a patient with cardiac failure and myocarditis was examined. The patient's age, gender and the absence of additional risk factors suggested that she probably did not need coronary imaging. The absence of ischemic changes in the ECG also supports this approach.<sup>1</sup> However, considering the patient's advanced troponin elevation and left ventricular wall damage, this patient can also be considered as a non-ST elevated myocardial infarction (NSTEMI) patient.<sup>1,8</sup> The fact that the patient is not hemodynamically stable and in a cardiogenic shock situation also puts this patient in the high-risk NSTEMI class, and this situation requires the application of an immediate invasive strategy.<sup>8</sup> For these reasons, we think that coronary angiography would not be a wrong procedure for the patient.

The patient presented with signs of acute hemodynamic insufficiency, that is, shock, but the question of whether it is cardiogenic shock or septic shock may be open to discussion. The patient presented with general shock symptoms such as anuria, hypotension, lactate elevation, hypoxic ischemic liver findings, and the etiology was investigated. While the absence of hemodynamic improvement with saline infusion, the absence of an infection focus and low cardiac contractility in the patient were in favor of cardiogenic shock, fever and increased procalcitonin were seen as signs in favor of septic shock.<sup>1</sup> Procalcitonin elevation may be elevated due to multiple organ failure or acute kidney injury rather than a finding of infection.<sup>9</sup> In addition, pulmonary edema, hepatomegaly, jugular venous fullness, which are the major symptoms that can be seen during cardiogenic shock, are initially absent. Pulmonary edema developed in the later period due to acute respiratory distress syndrome and was not found in the first tomography.<sup>1,10</sup> Decreased contractility in the echocardiography of the patient does not exclude septic shock. Echocardiography findings are not necessarily normal in distributive shock samples such as septic

shock, spinal cord trauma, myxedema coma, and Addison's crisis. We can find decreased contractility such as cardiogenic shock.<sup>11,12</sup>

The authors also drew attention to a very important point. It has been demonstrated again with this case that negative repetitive PCR tests will not rule out COVID-19 disease.<sup>1</sup> This case report is also an important case report as it emphasizes that all patients should be treated as COVID-19 positive patients if clinical suspicion persists.

### Declaration of Competing Interest

The authors declare that they have no conflict of interest regarding this paper.

### References

- Jeantin L, Picjereau C, Pineton de Chambrun M, et al. Myocarditis, paraparesia and ARDS associated to COVID-19 infection. *Heart Lung*. 2021;50(1):6–8. <https://doi.org/10.1016/j.hrtlng.2020.10.008>.
- Mishra AK, Sahu KK, George AA, Lal A. A review of cardiac manifestations and predictors of outcome in patients with COVID - 19. *Heart Lung*. 2020;49(6):848–852. Nov-Decdoi: 10.1016/j.hrtlng.2020.04.019.
- Uzun Uslu P. Pandemia and Insomnia. *Eskisehir Med J*. 2020;1(1):5–9.
- Fang X, Li S, Yu H, et al. Epidemiological, comorbidity factors with severity and prognosis of COVID-19: a systematic review and meta-analysis. *Aging (Albany NY)*. 2020;12(13):12493–12503. <https://doi.org/10.18632/aging.103579>. Jul 13.
- Mishra A.K., Sahu K.K., George A.A., Lal A. A review of cardiac manifestations and predictors of outcome in patients with COVID - 19. *Heart Lung*. 2020 Nov-Dec;49(6):848–852.
- Ho JS, Sia CH, Chan MY, Lin W, Wong RC. Coronavirus-induced myocarditis: a meta-summary of cases. *Heart Lung*. 2020;49(6):681–685. Nov-Decdoi: 10.1016/j.hrtlng.2020.08.013.
- Turgay Yildirim Ö, Turgay A, Lafli Tunay D. COVID-19 Pandemic and Cardiovascular Effects. *J Cukurova Anesthesia Surg Sci*. 2020;3(3):128–133.
- Chieffo A, Stefanini GG, Price S, Barbato E, Tarantini G, Karam N, et al. EAPCI Position Statement on Invasive Management of Acute Coronary Syndromes during the COVID-19 pandemic. *Eur Heart J*. 2020;41(19):1839–1851. <https://doi.org/10.1093/eurheartj/ehaa381>. May 14.
- Vijayan AL, Vanimaya, Ravindran S, et al. Procalcitonin: a promising diagnostic marker for sepsis and antibiotic therapy. *J Intensive Care*. 2017;5:51. <https://doi.org/10.1186/s40560-017-0246-8>. Aug 3.
- Mebazaa A, Combes A, van Diepen S, Hollinger A, Katz JN, Landoni G, et al. Management of cardiogenic shock complicating myocardial infarction. *Intensive Care Med*. 2018;44(6):760–773. <https://doi.org/10.1007/s00134-018-5214-9>. Jun.
- Levy MM, Evans LE, Rhodes A. The surviving sepsis campaign bundle: 2018 update. *Intensive Care Med*. 2018;44(6):925–928. <https://doi.org/10.1007/s00134-018-5085-0>. Jun.
- Rhodes A, Evans LE, Alhazzani W, Levy MM, Antonelli M, Ferrer R, et al. Surviving sepsis campaign: International guidelines for management of sepsis and septic shock: 2016. *Intensive Care Med*. 2017;43(3):304–377. <https://doi.org/10.1007/s00134-017-4683-6>. Mar.

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