Clinically suspected myocarditis in the course of coronavirus infection

Krzysztolf Ozieranski 1*, Agata Tyminska 1, and Alida L.P. Caforio 2

1First Department of Cardiology, Medical University of Warsaw, Warsaw, Poland and 2Cardiology, Department of Cardiac Thoracic Vascular Sciences and Public Health, University of Padova, Padova, Italy

We would like to comment on the case study published in the European Heart Journal. The presented 37-year-old patient was admitted to hospital due to chest pain, dyspnoea, diarrhoea, coronavirus-associated pulmonary infection, pseudo ST-segment elevation myocardial infarction (STEMI) with normal coronary arteries, hypotension, and decreased left ventricular ejection fraction. The patient was successfully treated with methylprednisolone (200 mg/day, for 4 days), intravenous immunoglobulin (IVIG; 20 g/day, for 4 days), piperacillin sulbactam, norepinephrine, diuretics, and milrinone.

We would like to comment on the case study published in the European Heart Journal. The presented 37-year-old patient was admitted to hospital due to chest pain, dyspnoea, diarrhoea, coronavirus-associated pulmonary infection, pseudo ST-segment elevation myocardial infarction (STEMI) with normal coronary arteries, hypotension, and decreased left ventricular ejection fraction. The patient was successfully treated with methylprednisolone (200 mg/day, for 4 days), intravenous immunoglobulin (IVIG; 20 g/day, for 4 days), piperacillin sulbactam, norepinephrine, diuretics, and milrinone.

Here we would like to raise several comments.

i. According to ESC 2013 criteria, the diagnosis is a clinically suspected myocarditis of uncertain aetiology, since endomyocardial biopsy (EMB) was not performed. Virology results of sputum are not sufficient to prove that the clinically suspected myocarditis was associated with coronavirus. In addition, cardiotropic viruses that are known to be associated with myocarditis were not investigated (enterovirus, often associated with diarrhoea; or parvovirus B-19, often associated with pseudo-infarct presentation).

ii. The authors’ assumption that the clinically suspected myocarditis is due to COVID-19 is unlikely to be correct for the following reasons.

a. Out of >180 000 known COVID-19 patients, the scenario of clinically suspected myocarditis is uncommon. Chen3 reported that among the 120 SARS-CoV-2-infected patients included in their study, elevated NT-proBNP (n = 33; 27.5%) and cTnI (n = 12; 10%) levels were recorded, yet it remains uncertain whether these patients had additional cardiovascular comorbidities, such as hypertension, coronary artery disease, diabetes, multi-organ failure, or ARDS, which may per se explain increased NT-proBNP and troponin without postulating the occurrence of myocarditis. Thus, current epidemiological data do not support the hypothesis that myocarditis is associated with COVID-19, or that it is common.

b. COVID-19 at present is not a known cardiotropic virus (e.g. it does not infect and replicate in the cardiomyocytes); another cardiotropic virus (e.g. an enterovirus) could be the causative agent, but again proven diagnosis is based on EMB.

c. The use of i.v. corticosteroids is controversial even in pneumonia due to COVID-19 virus infection according to the WHO, because it may lead to reduced viral clearance and increased risk of sepsis6.

d. IVIG are also questionable, since there is no IgG response to COVID-19 in the plasma donors’ pool.

In conclusion, this is a case of clinically suspected myocarditis of undefined aetiology (Viral due to known cardiotropic viruses? Transient unspecfic myocardial injury and dysfunction during the hyperinflammatory state and cytokine storm? Immune-mediated?). Moreover, it was treated with an empirical 4-day course of methylprednisolone, which might in fact be detrimental both for COVID pneumonia2 and the clinically suspected COVID-associated myocarditis,2 and with IVIG that was neutral or useless for a hypothetical COVID myocarditis because IVIG do not contain IgG to COVID (normal blood donors, as the whole of the world’s population are at risk).

Conflict of interest: none declared.

References

1. Hu H, Ma F, Wei X, Fang Y. Coronavirus fulminant myocarditis saved with glucocorticoid and human immunoglobulin. Eur Heart J 2020;doi:10.1093/eurheartj/ehaa190.

2. Caforio AL, Pankuweit S, Arbustini E, Basso C, Gimeno-Blanes J, Felix SB, Fu M, Helio T, Heymans S, Jahns R, Klingel K, Linhart A, Massch B, McKenna W, Mogensen J, Pinto YM, Ristic A, Schultheiss HP, Seggewis H, Tavazzi L, Thiene G, Yilmaz A, Charron P, Elliott PM. European Society of Cardiology Working Group on Myocardial and Pericardial Diseases. Current state of knowledge on aetiology, diagnosis, and treatment of myocarditis. Eur Heart J 2013;34:2874-2884. doi:10.1093/eurheartj/eht225.
3. Chen C, Zhou Y, Wang DW. SARS-CoV-2: a potential novel etiology of fulminant myocarditis. Herz 2020;doi: 10.1007/s00059-020-04909-z

4. WHO. Clinical Management of Severe Acute Respiratory Infection (SARI) When COVID-19 Disease is Suspected. https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected?WHO reference number: WHO/2019-nCoV/clinical/2020.4