

## INTRODUCTION

COVID-19 infection caused by SARS-CoV-2 is a global health crisis with a total number of more than 200 million confirmed cases worldwide and 2 million confirmed cases in Malaysia alone. It is a pandemic with multiorgan involvement and wide range of clinical manifestations resulting in various complications including thrombotic event.

The thrombotic complications may result in severe illness and long-term sequelae which commonly manifested as pulmonary embolism, cerebral infarction and venous thromboembolism while less commonly seen are acute myocardial injury, renal artery thrombosis, and mesenteric ischemia<sup>1</sup>.

In general, it is estimated around 13–41% of hospitalized patients with acute COVID-19 infection developed cardiac injury evidenced by elevated troponin levels while another study in China reported a 12% rate of myocardial injury in patients with COVID-19 infection based on biomarker elevation.<sup>2,4</sup>

## CASE REPORT

31 years old Malay lady previously no known medical illness presented to Emergency Department with atypical symptoms of pricking epigastric pain, bloatedness and nausea 7 months post category 3 COVID-19 infection. Physical examination was unremarkable however initial electrocardiogram (ECG) was suspicious of inferior myocardial infarction. Repeated ECG then showed ST elevation at lead II, III, aVF with reciprocal changes in keeping with diagnosis of acute inferior myocardial infarction. High sensitivity Troponin I at that time was not suggestive which was 7.0ng/L however bedside echocardiography revealed hypokinetic myocardial wall at right coronary artery (RCA) territory.

Patient was then referred to medical team for urgent angiogram in view of high index of suspicion of acute myocardial infarction which later revealing three vessel diseases (3VD). Primary percutaneous coronary intervention (PCI) was done to RCA. Patient was later planned for stage PCI to left anterior descending artery (LAD) and left circumflex artery (Lcx) in 1 month and was started with double antiplatelets.

## DISCUSSION

Thrombotic complication in SARS-CoV-2 infected patients is documented around 25–30% while another study demonstrated an 8% risk of acute cardiac injury in patients with COVID-19 infection with a 13-fold higher occurrence in critically ill patients<sup>1,3</sup>.

Thrombogenesis in patients with COVID-19 have been postulated to be due to markedly increased procoagulants which correlate with acute phase reactants as SARS-CoV-2 is known to infect the ACE2 receptor on endothelial cells resulting in accumulation of inflammatory cells and microcirculatory dysfunction described as endotheliitis leading to various thrombotic events<sup>4</sup>. Acute coronary events in COVID-19 infection could be contributed by different potential etiologies as the results of a direct or indirect effect of severe viral infection. Such acute coronary events could result from the extreme increase in myocardial demand triggered by infections that will precipitate myocardial injury (type II myocardial infarction) and circulating cytokines released during a severe systemic inflammatory stress will lead to atherosclerotic plaque instability and rupture (type I myocardial infarction)<sup>5</sup> as seen in Figure 1 and 2.

COVID-19 acute myocardial injury is described as the elevation of high-sensitivity cardiac troponin above the 99th percentile of its upper limit of normal or manifestation of new ECG or echocardiographic abnormalities<sup>1</sup>. Atypical presentations in myocardial infarction are more likely to occur in elderly, women, and diabetic patient. Although chest pain is the most common presentation of acute myocardial infarction, these special group of people are also known to present with atypical symptoms such as giddiness, dyspnoea, vomiting, sweating, and epigastric pain similar with our patient whose presented with atypical presentation of epigastric pain and bloatedness<sup>6</sup>.

In our case report, our patient has normal value of high sensitivity Troponin I, however both ECG and bedside echocardiography support our diagnosis of acute myocardial infarction. Our high degree of suspicion towards acute myocardial infarction in this post COVID-19 patient was helpful in establishing the diagnosis as the angiogram done revealed three vessel diseases (3VD). Clinically, a high level of suspicion should be raised for thrombosis in patients with SARS-CoV-2 infection<sup>4</sup>. This case is rare as this thrombotic event manifested as acute myocardial infarction in young lady with no cardiovascular history prior to this episode just 7 months post COVID-19 infection.

It is well recognized that patients infected with SARS-CoV-2 with pre-existing cardiovascular disease and risk factors such as hypertension and diabetes have a higher risk of developing an acute coronary syndrome during acute infections with increased risk of severe disease and death than individuals who are younger and healthier<sup>5</sup>. However, patients with no predisposing factors such as our patient could also developed myocardial infarction as a study exhibited that patients with minimal COVID-19 symptoms can also experience thromboembolic complications after the acute phase of COVID-19 infection has passed<sup>7</sup>. Cardiac involvement was found in a patients recovered from COVID-19 infection supported by cardiac magnetic resonance manifestation such as myocardial oedema, fibrosis, and impaired right ventricle function. Therefore, precaution should be paid to the possible myocardial involvement in patients recovered from COVID-19 with cardiac symptoms<sup>8</sup>.

The treatment of myocardial infarction is controversial in COVID-19 patients. In patients diagnosed with an ST elevation myocardial infarction concurrent with COVID-19, while fibrinolysis may be considered, PCI is more commonly performed at most institutions and remains the treatment of choice<sup>9</sup>. However, PCI is the gold standard treatment in our patient, as patient already passed the infectious period of COVID-19.

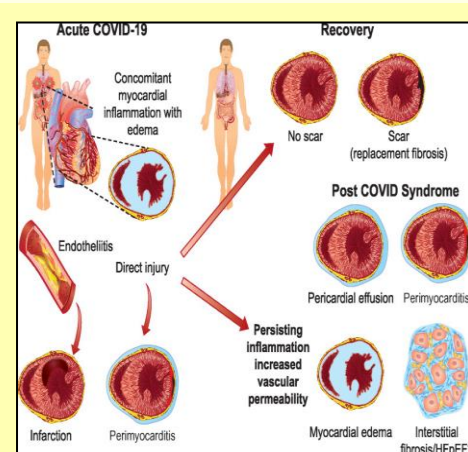


Figure 1: Acute and chronic outcomes of symptomatic COVID-19 infection for the heart  
Image credit to PubMed Central

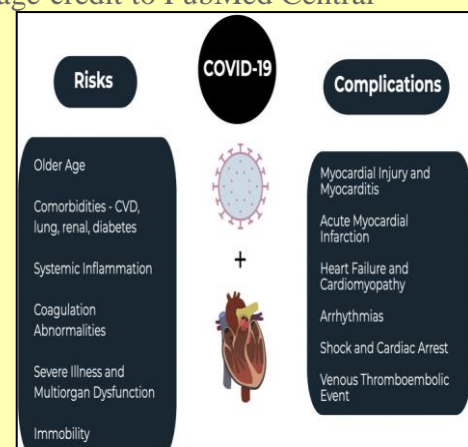


Figure 2 : COVID-19 and the cardiovascular system  
Image credit to PubMed Central

## CONCLUSION

COVID-19 pandemic is a global burden not only for the disease itself but long-term care of COVID-19 survivors. It is more than just a respiratory syndrome but come with multisystem long-COVID effects, while COVID-19 cardiovascular complications are well established, we would like to addressed significant cardiovascular long-term complication in COVID-19 survivor.

## REFERENCES

- Cameli M, et al (2021) COVID-19 and Acute Coronary Syndromes: Current Data and Future Implications. *Front. Cardiovasc. Med.* 7:593496. doi: 10.3389/fcvm.2020.593496
- Matthias G Friedrich and Leslie T Cooper, Jr. What we (don't) know about myocardial injury after COVID-19. *Eur Heart J.* 2021. doi: 10.1093/eurheartj/ehab145
- Diaz T, Trachtenberg BH, Abraham SJK, KosagiSharaf R and Durant-Archibold AA (2020) Aspirin Bioactivity for Prevention of Cardiovascular Injury in COVID-19. *Front. Cardiovasc. Med.* 7:562708. doi: 10.3389/fcvm.2020.562708
- Kathleen M. et al, Acute myocardial infarction secondary to COVID-19 infection: A case report and review of the literature. doi.org/10.1016/j.clinimag.2020.11.030
- Robert O. Bonow et al, Association of Coronavirus Disease 2019 (COVID-19) With Myocardial Injury and Mortality, 2020 American Medical Association.
- Savith A. Clinical Profile of Acute Myocardial Infarction in Elderly Patients: A Cross Sectional Study. *Int J Sci Stud* 2015;3(6):65-68
- Huang L, Zhao P., Tang D., Zhu T., Han R., Zhan C. Cardiac involvement in patients recovered from COVID-2019 identified using magnetic resonance imaging. *JACC. Cardiovasc Imaging.* 2020;13:2330-2339.
- Ruiz-Ares G, et al, Concurrent Stroke and Myocardial Infarction After Mild COVID-19 Infection. *Neurologist.* 2021 May 5;26(3):86-89. doi: 10.1097/NRL.0000000000000311. PMID: 33942789; PMCID: PMC8143152.
- Long B., Brady W.J., Koyfman A., Gottlieb M. Cardiovascular complications in COVID-19. *Am J Emerg Med.* 2020;38:1504-1507. doi: 10.1016/j.ajem.2020.04.048