

# Need of the Hour—COVID-19 for Cardiologists

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The most distressing pandemic at present is coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).<sup>1</sup> Even though COVID-19 predominantly affects the lungs by causing acute respiratory distress syndrome, the heart is not completely spared. People with underlying heart disease are at risk. The main aim of this article is to summarize the available evidence of cardiac involvement in COVID-19 patients and outline precautions to patients with underlying cardiovascular disease (CVD).

People with the cardiopulmonary disease are at higher risk. As the virus survives in low temperatures, nose and sinuses are the main sources of infection. This virus could affect the heart, especially a diseased heart. Although information about COVID-19 is changing on an hourly basis, information of the previous severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS)–producing coronaviruses offers insight.<sup>2</sup> They were linked to cardiac disease as they produced inflammation of the heart muscle, myocardial infarction, and rapid-onset heart failure.

Most of the published information on COVID-19 is from China. Three important publications in *New England Journal of Medicine*, *Lancet*, and *Allergy* are based on the cases from China.<sup>3–5</sup> Even though the initial study published in *Lancet* showed male preponderance (70% males), in a short duration another publication in *Allergy* showed a 1:1 ratio of male (50.7%) and female involvement. Initial studies showed low association of chronic cardiac diseases (10%) in COVID-19 patients along with the acute cardiac injury accounting to 23%. Acute cardiac injury was diagnosed when hyper-sensitive cardiac troponin I was > 28 pg/mL. Recent studies have showed increased association of CVD, up to 40%, in COVID-19 patients. But more recent studies have showed increased association of CVD, up to 40%, in COVID-19 patients. Fifty percent of COVID-19 patients had comorbidities, most common was hypertension (in 30%), diabetes (in 19%), and coronary artery disease (in 8%). This high proportion of CVD

was the cause for high mortality in patients with COVID-19. COVID-19 in patients with compensated heart failure may precipitate heart failure.<sup>6</sup> In COVID-19 patients cardiovascular disorders including arrhythmias may occur due to drug therapy for the diseases, especially the antiviral drugs or drug interactions. So, these patients also require close monitoring.

Even though the comorbid conditions association with COVID-19 was high, acute myocardial infarction was reported only in one young female who had normal coronaries on angiogram. These reports with new information urge cardiologists to warn patients about the potential risk and encourage them to practice “additional, reasonable precautions” for those with underlying heart disease.

The mechanism of increased risk for cardiovascular disease patients to COVID-19 is not clear.<sup>7</sup> The virus penetrates the cell through the angiotensin-converting enzyme 2 (ACE2) receptor and then multiplies to produce the disease. These receptors are present on epithelial cells of the lung, intestine, kidney, and blood vessels.<sup>8</sup> Patients with hypertension and diabetes, who receive angiotensin-converting enzyme inhibitors (ACEIs) and angiotensin receptor blockers (ARBs) have more expression of these ACE2 receptors on the target cells, which may facilitate the entry of the virus (► **Fig. 1**). But a similar effect is not seen with calcium channel blockers.

Previously, acute myocarditis and heart failure was reported with MERS-CoV. As SARS-CoV-2 and MERS-CoV have similar pathogenicity, myocardial injury caused due to SARS-CoV-2 infection may be immune mediated through the ACE2 receptor or cytokine storm and/or hypoxia due to acute respiratory distress syndrome (ARDS).<sup>9</sup> Added myocardial damage along with ARDS makes the patient's prognosis worse and treatment becomes difficult and complex. During the course of progression of COVID-19 disease, due to intense systemic inflammatory response more frequent cardiac involvement occurs.

Deaths from COVID-19 are due to cytokine storm syndrome and fulminant myocarditis. Cytokine storm syndrome culminates as ARDS. Fulminant myocarditis is primarily

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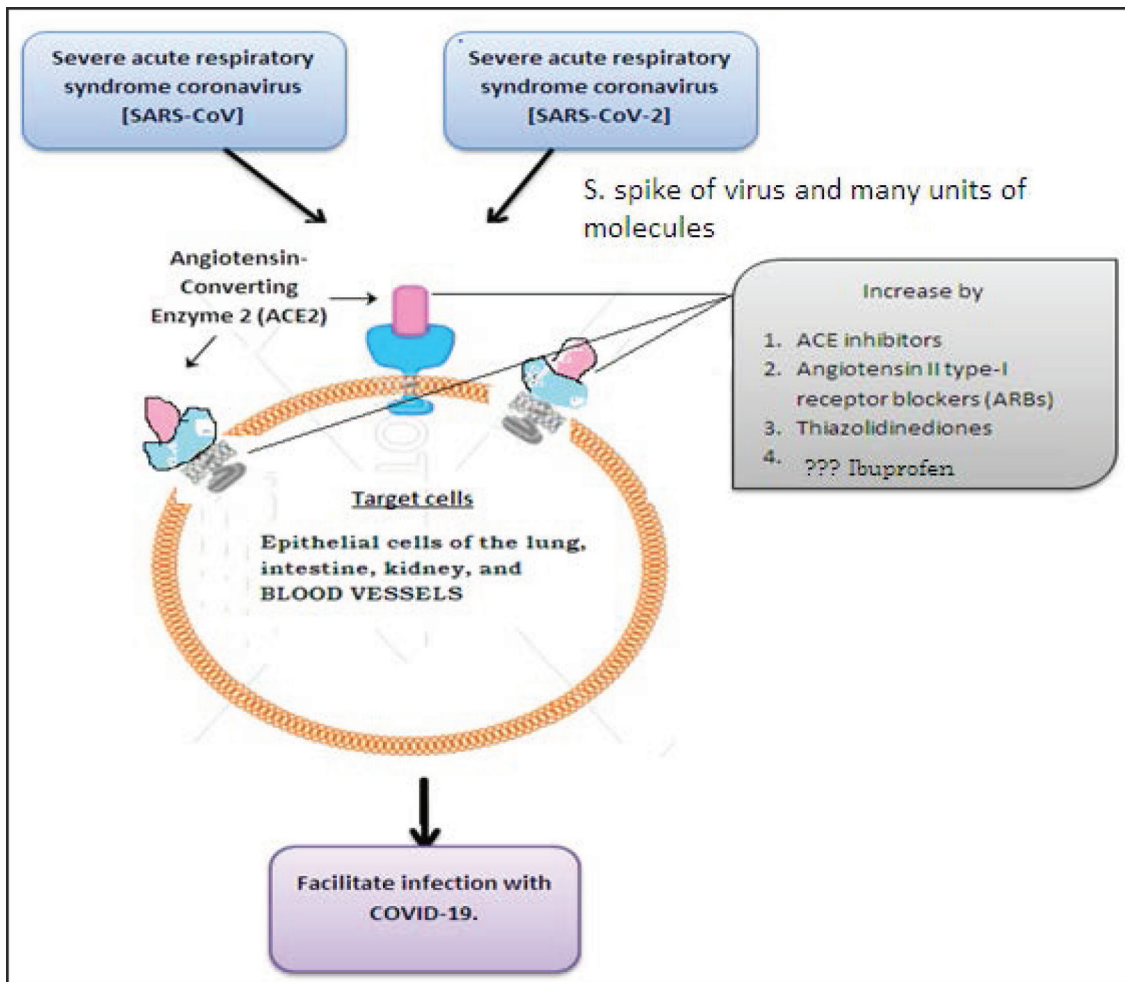


Fig. 1 Role of ACE2 receptors in COVID-19.

caused by infection with viruses, with mortality rates as high as 50 to 70%.

Concern about the continuation of ACEIs and ARBs for patients who are already taking them was discussed by different hypertensive societies.<sup>10-13</sup> The European Society of Hypertension and the European Society of Cardiology council on hypertension encourage the use of ACEIs/ARBs due to lack of evidence supporting their role in COVID-19. Even other societies like Hypertension Canada<sup>12</sup>; Canadian Cardiovascular Society<sup>13</sup>; The Renal Association, United Kingdom<sup>14</sup>; International Society of Hypertension<sup>15</sup>; American College of Physicians<sup>16</sup>; Spanish Society of Hypertension<sup>17</sup>; American Heart Association<sup>18</sup>; Heart Failure Society of America<sup>19</sup>; American college of Cardiology<sup>20</sup>; European Renal Association-European Dialysis and Transplant Association<sup>21</sup>; American Society of Pediatricnephrology<sup>22</sup>; and High Blood Pressure Research Council of Australia<sup>23</sup> recommend the continued use of ACEs/ARBs. The three United States medical societies<sup>16,18,20</sup> advise patients on ACEI or ARB to not stop the current treatment unless advised by their doctors if they contract COVID-19. In addition, European Society of Hypertension and Spanish Society of Hypertension recommend case-by-case changes of the drugs in seriously ill patient.

Other drugs that are used in CAD patients like statins, antiplatelets, and  $\beta$ -blockers were discussed in the webinar jointly released by the American College of Cardiology (ACC) and Chinese cardiology association. They recommend to continue statin but with close monitoring. Antiplatelets and  $\beta$ -blockers are also to be continued. If steroids are required for fulminant myocarditis, the dose should be low to moderate. If a COVID-19 patient comes with ST elevation myocardial infarction (STEMI), then thrombolysis should to be considered. If primary percutaneous coronary intervention (PCI) is required then it is better to do it in isolated cath laboratories. If they are not available and mandatory to do then minimum central air circulation in the cath laboratory.

At present we know only about the acute course of the disease. We need to follow these patients for long-term effects. SARS-CoV-infected patients on long-term follow-up of 12 years showed hyperlipidemia (68%), cardiovascular system abnormalities (44%), and glucose metabolism disorders (60%).<sup>24</sup> As SARS-CoV 2 also has similar pathogenicity as SARS-CoV, follow-up of these COVID-19 patients for cardiac events and altered metabolic status is required.

With this increasing need for awareness of cardiac diseases in COVID-19, ACC released a clinical bulletin for

the cardiac care team.<sup>20</sup> Cardiac complications in COVID-19 simulates that of SARS, MERS, and influenza. The cardiologist has to assist other clinical specialties to manage the cases of COVID-19 with cardiac complications. Echocardiography (ECG) should be done in patients with ECG changes and those demonstrating heart failure, arrhythmia, or cardiomegaly. Patients with CVD are at risk of contracting COVID-19 and have a worse prognosis. As there is an increased risk of secondary infections with COVID-19, patients are advised to remain current with vaccinations, including the pneumococcal vaccine and influenza vaccine in accordance with current ACC/American Heart Association (AHA) guidelines. In patients with heart failure or volume overload conditions, fluid administration should be carefully monitored.

Strategies should include identifying cardiovascular patients with COVID-19 symptoms from other patients, including the outpatients, substituting telephonic or telehealth consultations for in-person reviews of stable CAD patients in order to prevent possible nosocomial COVID-19 infections.<sup>21</sup>

Care should be taken to avoid underdiagnosis of AMI in the COVID-19 setting.

Based on a small study of 26 patients in France and 16 non-randomised trials, it is believed that the time taken to resolve viral shedding from COVID-19 patients is decreased by treatment with hydroxychloroquine alone or in combination with Azithromycin.<sup>25</sup> With raised concerns about the increased risk of arrhythmic death caused by QT prolongation associated with use of chloroquine, hydroxychloroquine, or azithromycin (alone or in combination), hydroxychloroquine or chloroquine therapy should occur in the context of a clinical trial or registry, until sufficient evidence is available for use in clinical practice.<sup>26</sup>

Regarding the management of patients with ACS in the setting of COVID-19, SCAI consensus is to preferably take true STEMI patients for primary angioplasty and to avoid diagnostic or therapeutic interventions in NSTEMI ACS patients with low risk features. It is also recommended to avoid endotracheal intubation in the cath lab as much as possible, but if it must be done, it is advised to remove all nonessential personnel from the lab to avoid potential exposure to aerosolized virus. For patients in respiratory distress, intubation before transfer to the cath lab is advised to avoid aerosolization.<sup>27</sup>

In conclusion, the exact mechanism through which SARS-CoV-2 causes COVID-19 is not known; it may be through the ACE2 receptors and immune mechanism. SARS-CoV-2 infection in patients with underlying CVD have worse prognosis. Cardiovascular protection should be given attention during the treatment for COVID-19.

#### Conflict of Interest

None declared

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