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EDITORIAL

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Management of crash and burn patients with SARS-CoV-2 associated ARDS

To the Editor,

In December 2019, China reported an outbreak of a new coronavirus in Wuhan, China.[1] Since then the number of SARS-CoV-2 positive patients has expanded exponentially over several continents in only a few weeks. The first case in the United States was diagnosed in February of 2020 and by mid-March there were over 400 000 positive cases, leading to a great strain on our health care system.

The Chinese and Iranian experience led to international efforts to institute various types of isolation techniques from quarantine to social distancing. Italy, who may have failed to implement some of these measures soon enough, has demonstrated high mortality related to this disease. Other European countries have shown that social distancing may have been a key preventive mechanism.

The Miami Transplant Institute is the highest volume transplant center in the United States, and we are frontline in contributing to faculty, staff, expertise, and cutting-edge technology to care for these patients. We have outlined here a few of the therapeutic modalities currently being used or under consideration at our institution.

1 | PHARMACOTHERAPY

Different pharmaceutics have been proposed to prevent or to treat the disease. Manipulations on the ACE2 receptor have been the target of different therapeutic initiatives. Hydroxychloroquine and azithromycin, as well as ivermectin, have been reported by the French and Australian groups to decrease the viral load. Interleukin-6 modulators have also been used. Outcomes of these treatment regimens are yet to be determined.

2 | HUMAN RECOMBINANT SOLUBLE ACE2 CAN INHIBIT SARS-COV-2 INFECTION IN A DOSE-DEPENDENT MANNER

ACE2 has taken a center stage in the COVID-19 outbreak as the key receptor for the spike glycoprotein of SARS-CoV-2 as demonstrated in multiple structural and biochemical studies.[2] Multiple pharmaceutical projects are focusing on the ACE2 and SARS-CoV-2 interactions. COVID-19 interacts with a portion of ACE2 which does not interfere its catalytic activity and colleagues describe the production of a recombinant soluble therapeutic ACE2 which binds to the COVID-19 virus and prevents the infection of the lung. And so can reduce the viral load by factor 1000 to 5000. The inhibition is not complete but dose-dependent.

3 | APPLICATION OF SOMATIC STEM CELLS FOR COVID-19 POSITIVE WITH ACUTE RESPIRATORY DISTRESS SYNDROME

3.1 | Bone marrow/unrestricted somatic stem cells

Somatic stem cells including bone marrow somatic stem cells and unrestricted somatic stem cells (USSCs) could play a role in mitigating the acute cytokine release and/or to help prevent long-term fibrosis in these patients. At our institution, we have established the applied USSCs for patients on extracorporeal membrane oxygenation (ECMO) who fail to show an improvement in respiratory function in the first 7 days as assessed by regular weaning trials which are performed every other day, or those who are deemed not weanable after 21 days of ECMO support. Early results show very encouraging outcomes at our center.

3.2 | Convalescent plasma application

Plasma from survivors has successfully been used to treat actively infected patients. Finding the appropriate number of donors is, of course, the challenging part.

3.3 | Acute respiratory distress syndrome management

As reported by others, we have also observed that the respiratory failure phenotype induced by the COVID-19 virus behaves differently than the acute respiratory distress syndrome we typically see in patients with other types of infectious pneumonia such as H1N1 or bacterial. They present with a Murray score > 3 usually which develops over several hours from a normal-looking chest X-ray. Proning has been shown to improve the oxygenation in this patient population. Patients who have not improved with proning have shown improvement in respiratory function after application of venovenous

(VV) ECMO support and the EMPROVE protocol.[3] We use the left femoral vein and right internal jugular vein as our ideal cannulation site. Currently, we are treating four SARS-CoV-2 positive patients with VV ECMO at our center. European centers report at least a 60% survival rate using VV ECMO in these patients, whereas the veno-arterial ECMO application is much lower and has extracorporeal cardiopulmonary resuscitation-like expected survival.

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