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EVALUATION OF THE EFFICACY OF DEXMEDETOMIDINE IN COVID-19 DISEASE

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Abstract:

The coronavirus disease (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is an ongoing global public health problem. Dexmedetomidine, sold under the trade name Precedex among others, is an anxiolytic, sedative and analgesic. Dexmedetomidine is notable for its ability to provide sedation without the risk of respiratory depression and can provide cooperative or semi-excitation.

Keywords: Coronavirus, drug, COVID-19, dexmedetomidine, cells, virus

INTRODUCTION

Clinical manifestations of COVID-19 range from asymptomatic infection to severe acute respiratory failure and multiple organ dysfunction requiring organ-sparing therapy such as mechanical ventilation in the intensive care unit. Once established, multiple organ dysfunction is associated with a decrease in survival and quality of life of patients after discharge from the intensive care unit. There is an urgent need to understand the disease mechanisms underlying COVID-19 in order to develop new therapeutic strategies to improve patient survival[1].

MATERIALS AND METHODS

Suppressive immune activation leading to "cytokine storm" and systemic hypoxemia caused by pulmonary dysfunction can lead to cell death in vital organs including the brain, lungs, kidneys, liver and intestines and are thought to contribute to multiple organ dysfunction and adverse outcomes for COVID-19. Although a number of therapeutic approaches have been proposed or tried to modulate the impaired immune response in COVID-19, so far only dexamethasone, a potent glucocorticoid steroid with broad effects on innate and adaptive immunity, has been shown to improve patient survival. Accumulating evidence indicates that cell necrosis and necroptosis (programmed cell death) are key mechanisms of cell death involved in both acute organ injury and chronic inflammatory disease[2]. -CoV-2, the resulting cell death can lead to widespread activation of immune cells through the activation of pattern recognition receptors on innate immune cells. The therapeutic efficacy of antivirals such as remdesivir, a nucleotide analog that inhibits viral RNA polymerase, or lopinavir/ritonavir, a combination viral protease inhibitor used to treat human immunodeficiency virus 1 (HIV-1), remains to be tested. It has also been proposed to target angiotensin-converting enzyme 2 (ACE2), the cell surface receptor by which SARS-CoV-2 enters cells to replicate, or to suppress systemic inflammation with anti-tumor necrosis factor antibodies[3].

RESULTS AND DISCUSSION

It may be useful to look at the cell death pathways involved in the development of multiple organ dysfunction during infection. Strategies that inhibit upstream cell death pathways may prevent downstream immune activation associated with multi-organ dysfunction associated with COVID-19. In addition, direct inhibition of alveolar cell death may preserve lung architecture and prevent some long-term consequences such as dyspnea in patients who have recovered from COVID-19.

In addition, maintaining the alveolar-capillary interface, which provides an anatomical barrier, may prevent secondary bacterial infection associated with SARS-CoV-2.

A potent and selective α_2-adrenergic agonist, dexmedetomidine has a sedative and analgesic effect and is widely used as an adjuvant for anesthesia, analgesia and sedation in intensive care units. In

[1] Callaway E, Siranoski D, Mallapati S, Stoj E, Tollefson J. Coronavirus Pandemic in Five Powerful Diagrams. Nature 2020; 579:482e3

[2] Zaim S, Chong JH, Sankaranarayanan V, Harky A. COVID-19 and multi-organ response. Course Probl Cardiol 2020; 45:100618

[3] Welz PS, Wullaert A, Vlantis K, et al. FADD prevents RIP3-mediated epithelial cell necrosis and chronic intestinal inflammation. Nature 2011; 477:330e4

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addition, dexmedetomidine has both cytoprotective and anti-inflammatory properties. In fact, its organ-protective action against acute injury to organs such as the brain, lungs, and kidneys has been well studied in preclinical settings. Mice treated with dexmedetomidine showed a reduction in inflammation-induced cell death (pyroptosis) in astrocytes and, in turn, neuronal protection from sepsis-induced brain injury. The main protective mechanisms of dexmedetomidine include an increase in parasympathetic tone, suppression of the inflammatory response, prevention of cell death, and inhibition of oxidative stress. By increasing parasympathetic tone and decreasing sympathetic tone, dexmedetomidine has a protective effect on immune function by acting on T cells and natural killer cells. In addition, its cholinergic anti-inflammatory mechanisms can suppress excessive inflammatory responses. An intensive care trial has shown that dexmedetomidine is effective in reducing the incidence of delirium in elderly patients[4].

Based on these properties, we hypothesize that dexmedetomidine may serve as a novel therapeutic strategy to mitigate COVID-19 vital organ damage while providing beneficial sedation to allow oxygen therapy through non-invasive or invasive mechanical therapy. ventilation . Dexmedetomidine sedation in the intensive care unit is associated with impaired respiratory response to hypoxia and hypercapnia to the same extent as propofol sedation, indicating that dexmedetomidine ventilation suppression is likely due to effects on both peripheral and central respiratory regulation . This weakening of the respiratory drive may be beneficial for patients with COVID-19 requiring mechanical ventilation, in whom hyperventilation and respiratory distress associated with hypoxemia are serious problems[5].

CONCLUSION

We suggest considering dexmedetomidine when sedation is needed early in the disease to help prevent the onset or progression of multi-organ dysfunction in COVID-19. When deep sedation is required, dexmedetomidine may be used as a sedative adjunct along with other sedatives such as propofol or midazolam. Its use as monotherapy may also be considered to facilitate non-invasive ventilation or during release from invasive mechanical ventilation, although the risk of bradycardia and hypotension should be taken into account at high doses[6]. Thus, there is good reason for further clinical trials examining the effect of dexmedetomidine on outcomes in ICU patients with COVID-19.

REFERENCES

1. Callaway E, Siranoski D, Mallapati S, Stoj E, Tollefson J. Coronavirus Pandemic in Five Powerful Diagrams. Nature 2020; 579:482e3
2. Zaim S, Chong JH, Sankaranarayanan V, Harky A. COVID-19 and multi-organ response. Course Probl Cardiol 2020; 45:100618
3. Welz PS, Wullaert A, Vlantis K, et al. FADD prevents RIP3-mediated epithelial cell necrosis and chronic intestinal inflammation. Nature 2011; 477:330e4
4. Grain J, Omagari N, Shin D, et al. Compassionate use of remdesivir for patients with severe Covid-19. N Engl J Med 2020; 382:2327e36
5. Vaduganathan M, Vardeni O, Michelle T, McMurray J. J. W., Pfeffer M. A., Solomon S. D. Reninangiotensin aldosterone system inhibitors in patients with Covid-19. N Engl J Med 2020; 382:1653e9
6. Su X, Meng ZT, Wu XH, et al. Dexmedetomidine for the prevention of delirium in elderly patients after non-cardiac surgery: a randomized, double-blind, placebo-controlled trial. Lancet 2016; 388:1893e902
7. Wang K, Wu M, Xu J, et al. Effects of dexmedetomidine on perioperative stress, inflammation, and immune function: a systematic review and meta-analysis. Br J Anast 2019; 123:777e94
8. Sun Yu-B, Zhao X, Mu D-L et al. Dexmedetomidine inhibits astrocyte pyroptosis and subsequently protects the brain in in vitro and in vivo models of sepsis. Cell Death Dis 2019; 10:167
9. Ma J, Chen K, Li J, et al. Dexmedetomidine-mediated prevention of renal ischemia-reperfusion depends in part on cholinergic anti-inflammatory mechanisms. Anest Analg 2020; 130:1054e62

[4] Grain J, Omagari N, Shin D, et al. Compassionate use of remdesivir for patients with severe Covid-19. N Engl J Med 2020; 382:2327e36

[5] Su X, Meng ZT, Wu XH, et al. Dexmedetomidine for the prevention of delirium in elderly patients after non-cardiac surgery: a randomized, double-blind, placebo-controlled trial. Lancet 2016; 388:1893e902

[6] Ma J, Chen K, Li J, et al. Dexmedetomidine-mediated prevention of renal ischemia-reperfusion depends in part on cholinergic anti-inflammatory mechanisms. Anest Analg 2020; 130:1054e62