

Hemoperfusion Can Control Inflammatory Factors in Patients with COVID-19

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Coronaviruses are a large group of viruses that cause a wide range of illnesses such as the common cold and severe problems. Among the most severe complications of these viruses are Middle East Respiratory Syndrome (MERS-CoV) and severe acute respiratory syndrome (SARS). Meanwhile, the new coronavirus, which has been introduced in late 2019 (COVID-19), is a new strain of this viral family that was first introduced from Wuhan, China, as previously unseen in the human population [1].

Infection with this new virus causes different clinical conditions in patients. So far, clinical features from an asymptomatic form to a severe disease with respiratory, heart, kidney failure and the need for hospitalization in the intensive care unit and the use of mechanical ventilation, multi-limb involvement and even multi-limb failure have been reported. However, in many patients, some symptoms such as fever, fatigue, dry cough, nasal congestion, shortness of breath, myalgia and arthralgia, lymphopenia, high plasma reactive protein levels, and elevated lactate dehydrogenase are common. Meanwhile, a significant number of patients die due to deteriorating clinical conditions, which vary according to geographical location, public health conditions and immune system conditions [2].

Like many global epidemics caused by new viral agents, achieving definitive treatment or controlling the spread of the infection has been slow, and now most of the proposed methods are not definitive and research on

different levels of the disease is ongoing. In the meantime, what is certain is that patients with acute respiratory distress syndrome require much more ICU care and the cytokine storm created in them is more severe due to the severity of their disease [3]. It has previously been shown that the onset of sepsis is associated with increased serum levels of various proinflammatory mediators, and that when serum levels of these anti-inflammatory cytokines are greatly increased, patient mortality is significantly increased. Therefore, it seems that blocking these inflammatory mediators can slow or stop the process of sepsis and thus improve the clinical condition of patients [4]. Various methods of purification of blood outside the body such as continuous renal replacement therapy (CRRT), plasma adsorption on a resin after plasma separation from the whole blood; and high-dose CRRT with medium or high cut-off membranes have been proposed to reduce the serum level of cytokines, among which, hemoperfusion is one of the most important [5]. This involves passing blood through a cartridge in which the salts are removed by direct binding to the absorbent material. To be more precise, it can be said that this method works by using the absorption mechanism, related to the different cartridges that are presented in its structure. Hemoperfusion is different from hemodialysis because the mechanism of action of hemoperfusion is absorption but hemodialysis works with diffusion mechanism so that, in the case of continuous intravenous hemofiltration (CVVH), the

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mechanism of convection is added and no diffusion occurs [6]. Previous studies have confirmed the effect of hemoperfusion on decreasing serum levels of IL-6, IL-8, IL-1 β and TNF- α [7].

Because fluid output from the patient's body is adjusted to the same ratio as fluid intake during the CRRT procedure, improved peripheral capillary oxygen saturation during blood purification can be attributed to cytokine clearance rather than volume reduction [8].

According to the published results, interleukin-6 has been associated with large changes in serum levels in patients with COVID 19, so this immunological index is a potential indicator of disease severity in patients with coronavirus. Serum IL-6 levels in these patients without severe pneumonia caused an increase in serum IL-6 levels to predict the severity of pneumonia and COVID-19. IL-6 inhibits cytotoxic CD8 + T by inhibiting gamma interferon secretion. However, IL-6 has the ability to paralyze the antiviral response by inducing suppression of cytokine signaling and increasing PD-1 expression. The cell becomes systemic during an inflammatory response [9]. Reactive protein C (CRP) is another biomarker that increases in the early stages of coronavirus disease. However, severe changes in serum levels of this marker can be associated with more severe lung lesions in these patients. Studies show that the use of hemoperfusion can significantly reduce serum CRP and IL-6 levels after intervention. Based on the results of some previous studies, patients with severe Covid-19 disease may have fewer lymphocytes than people with milder forms of the disease [10].

Although the effectiveness of hemoperfusion as a definitive treatment for COVID 19 patients has not yet been confirmed, the evidence presented, especially in controlling the inflammatory status of patients with this infection, suggests that this method could be recommended as a treatment in such severe cases of COVID 19.

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