Hemodynamic instability is common when treating critically critical COVID-19 patients, especially patients with invasive mechanical ventilation, hemodynamic instability in trachea induction and sedative analgesia after intubation. rational application of vascular constriction drug in critical COVID-19 patients.

Immediately give norepinephrine or dopamine and other blood vessel constriction drugs pump into the pressure is a common phenomenon, although can maintain blood pressure, but should carefully identify the cause: First, COVID-19 patients the main symptoms of fever, fatigue and dry cough performance, and often accompanied by poor, anorexia and other discomfort, Insufficient intake on the basis of the increase in inductive water loss caused by fever, often lead to low blood volume shock, should first give appropriate fluid resuscitation, can refer to sepsis shock cluster treatment, 3 h within the give 30 ml/kg liquid resuscitation, but the rehydration process needs to closely monitor oxygenation changes, so as not to capacity overload aggravated lung damage. Secondly, sedative analgesic drugs can inhibit sympathetic nerve excitement leading to low blood pressure, timely adjustment of the dose of the drug at the same time carefully using vascular active drugs. Third, patients with a significant increase in the combination of myocardial enzymes (especially troponin) or (and) type B sodium urethra (BNP), common in critical COVID-19 patients, require close monitoring of heart function, considering the possibility of cardiac shock. Finally, it is necessary to be alert to sepsis shock, liquid resuscitation at the same time to measure blood lactic acid levels, retention of blood culture samples, given broad-spectrum antibiotics, close monitoring of changes in the average arterial pressure, the initial fluid resuscitation of non-reactive, given booster stomory drugs to maintain an average arterial pressure of 65 mm (1 mmHg s.133 kPa).

The selection of vascular constriction drugs is also very important, common drugs include norepinephrine, epinephrine, vasopressin, dopamine and dopamine, these drugs have their own characteristics but also need to be particularly vigilant about adverse reactions. Guidelines recommend that norepinephrine is the preferred vascular active drug, but it is important to note some adverse reactions associated with catecholamine during use. Vascular constriction drugs should be preferred deep vein catheter pumping, to prevent drug leakage leading to skin necrosis and other complications.

In the current outbreak, complex hemodynamic monitoring at the bedside is not recommended. When conditions permit, non-invasive and convenient means such as ultrasonic Doppler monitoring can be used to correctly handle different types of shock, to facilitate the rational selection of vascular constriction drugs.
Prevention of venous thrombolism (venous thromboembolism, VTE) in patients with COVID-19

Critical COVID-19 patients should pay attention to VTE risk due to long bed time and often abnormal coagulation function. Clinical observations found that nearly 20% of COVID-19 patients will have abnormal clotting function, almost all heavy and critical type patients have clotting dysfunction. In this regard, to pay attention to the existence of deep vein thrombosis (deep venous thrombosis, DVT) after the occurrence of pulmonary thromboembolism (pulmonary thromboembolism, PTE), for the sudden occurrence of oxygenation deterioration, respiratory distress, blood pressure decline and other clinical manifestations need to be alert to the occurrence of PTE, timely treatment. Risk assessment and preventive measures for VTE in patients with COVID-19, the Chinese Medical Association Respiratory Society Pulmonary Embolism and Pulmonary Vascular Disease Group has already been advised to prevent and treat, and will not be repeated here.

D-dipolymer is the most commonly used indicator for VTE monitoring. However, in the pre-study of patients with COVID-19, the patients with severe D-dipolymer level of the patients admitted to ICU increased significantly, and the correlation between D-dipolymer and the severity of COVID-19 disease should be considered while alert to VTE. Many studies have shown that increased D-dipolymer is associated with patient severity. Ribelles et al. found that D-dipolymer sympathetic mortality rates were highly correlated with patients with community-acquired pneumonia (CAP), and Snijders and others found similar results in analysis of 147 CAP patients, with fewer complications in patients with D-dipolymer levels of 500 μg/L. The reason may be that the inflammatory media causes the coagulation imbalance in the alveoli, and then there is a tendency to promote coagulation, activating the fibrous system and causing D-dipolymer to increase. However, the results of a prospective cohort study of 102 CAP patients, such as Duarte, showed no significant correlation between D-dipolymer levels and the severity of the disease. At present, there is no such thing as the dynamic evolution of D-dipolymer in patients with critical COVID-19 post-rehabilitation, and large sample analysis is required to determine the correlation between D-dipolymer and COVID-19 patient severity, so as to facilitate early intervention and correction.

Risk assessment and prevention of VTE are particularly important in the integrated treatment of COVID-19. Some patients change rapidly, VTE risk and bleeding risk in the course of treatment there is a dynamic change, should be dynamically evaluated, timely adjustment of strategy, reduce the occurrence of VTE, to prevent the occurrence of fatal PTE.

Nutritional support for critically critical COVID-19 patients

Nutritional support in critically critical COVID-19 patients is the basic treatment method and one of the core elements of the comprehensive treatment of COVID-19 patients. Most current guidelines
recommend early assessment of nutritional risk in patients staying in the ICU, setting nutritional support targets, such as early intestinal nutrition support within 24 to 48 h, without a contraindication. Common nutrition risk assessment tools include Nutritional Risk Screening (NRS 2002), Nutritional Risk Score (NUTRIC Score) for critically ill patients, and so on. High risk of false absorption, such as loss of airway protection, age 70, decreased level of consciousness, poor oral care, lying, gastroesophageal reflux, and single load to give intestinal nutrition, etc., can be preferred after-the-door feeding.

Goal setting mainly includes energy and protein. (1) Energy supply: It is recommended to control the amount of intravenous fluids in patients with COVID-19 patients who should pay attention to maintaining fluid balance, in terms of large areas of lung real change and elderly patients, according to the different severity of the disease, according to the supply of 20 to 30 kcal.kg-1.d-1. However, the author believes that these patients who have just been admitted to hospital, because of the early stage of the disease there is high fever, decreased appetite and other manifestations, often there is insufficient intake, it is recommended to properly rehydrate, and then adjust the balance of access. (2) Protein supply: Most guidelines consider protein demand to be appropriate in the range of 1.2 to 2.0 g/kg. Severe patients with severe diseases cause muscle atrophy due to increased protein breakdown and metabolism, which in turn affects survival and prognosis. Observational studies have shown that supplemental protein intake in patients with severe illness can reduce their mortality rate, but it is still controversial to determine the optimal protein needs of patients. In the study of Ferrie et al. (120 cases), the patient’s mortality rate was no different from that of ICU monitoring treatment compared to 0.8 g/kg, compared with 0.8 g/kg, and the TOP-UP study (125 cases) and the EAT-ICU study (203 cases) showed that protein intake had no effect on fatality, hospitalization time, mechanical ventilation, hospital infection rate, organ failure, etc. Therefore, in the process of nutritional support, we should pay attention to individual differences, closely observe adverse reactions and evaluate the therapeutic effect, dynamically adjust treatment plan, ensure energy supply at the same time, reduce metabolic stress response, improve prognosis.

4. Problems of plasma treatment in recovery period in patients with COVID-19

Recovery plasma therapy refers to a passive immunotherapy treatment that takes antibody-rich blood from patients during rehabilitation period and is then infusioned to other patients after special treatment. The core substance is the "antibody", antibodies refers to the body due to antigen (e.g. virus) stimulation of the protein with protective effect, after the virus is removed, the human body in the short term still has a higher level of antibodies, with a reduction over time. Studies have shown that antibodies produced in patients with severe acute respiratory syndrome (SARS) during recovery peaked at 4 months and then declined rapidly, with 11% of patients not detecting antibodies after 2 years of follow-up. Recovery plasma has been used in the treatment of some infectious diseases, but its efficacy and safety are still controversial.

A 2006 meta analysis of 1,703 patients suggested that in patients with H5N1 avian influenza, recovery plasma therapy may be an effective, timely and widely available treatment that should be studied in
clinical trials. In the treatment of severe influenza A(H1N1) influenza virus, a 2011 study showed that recovery plasma therapy reduced the viral load of the respiratory tract in patients and reduced cytokine reaction and fatality in serum. The meta analysis of a 2015 study of 32 studies on the treatment of SARS or influenza in recovery plasma also suggests that recovery plasma may reduce mortality and be safe.

However, a 2016 New England study showed that 500 ml of recovery plasma therapy did not improve survival in patients infected with Ebola virus, its effects may be affected by lower plasma antibody titer, and the effectiveness of plasma therapy with higher titer antibodies remains to be seen. A randomized double-blind phase 3 clinical study published by Lancet Respir Med in 2019 showed that high titer anti-flu immunoplasma titer (titer 1:80) had no significant benefit in the treatment of severe influenza compared to non-immune plasma (titer ≤ 1:10).

According to published literature on the use of immunoplasma therapy for other viral infection patients, the conditions to be met by the recovery plasma donor: (1) the patient has been fully recovered, the molecular biology and technical testing proved no virus residue; Antibodies, AIDS antibodies, syphilis helix antibodies negative; (3) the rehabilitation donor must sign an informed consent form and voluntarily donate plasma; (4) the donor body should have sufficient amount of antibody titer, conditional institutions can collect plasma antibody efficacy measurement or enrichment to produce more effective immunoserometric products. In terms of recipients, although there are studies showing that the clinical outcome of patients who received immunoserum therapy early is better than that of patients who received immunoserum therapy at an advanced stage, the adaptation of the treatment needed to be more stringent due to the complex plasma preparation process during the recovery period, difficulty in standardization, the short presence of antibodies in serum and the large amount of plasma required for this outbreak. Try for serious patients with fast-tracked or underlying diseases.

At present, the World Health Organization has not yet published guidelines on the recovery period of whole blood or plasma treatment for the new coronavirus, we can only empirically apply recovery plasma in COVID-19 patients, before blood transfusion needs to be clear whether the patient has a history of blood transfusion and blood transfusion allergy history, after the signing of an informed consent form Blood transfusion, adult stoush total of about 500 ml per blood transfusion, divided into 2 inputs, each blood transfusion continued 20 min and according to the patient's own conditions to adjust, speed should not be too fast, blood transfusion process closely monitor the patient’s vital signs, alert to the occurrence of allergic reactions, each blood transfusion interval of more than 15 min. After blood transfusion, the therapeutic effect should be evaluated according to the patient’s symptoms, signs, laboratory examination and imaging performance, and the doctor will decide whether to re-enter the recovery period plasma. However, the application that is more appropriate to this COVID-19 also needs to be evaluated in a high-quality, large sample of randomized trials, and should be adjusted according to the individual patient's circumstances.