

Clinical Characteristics and Management of Cancer Patients with COVID-19

Short Communication

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Abstract

The epidemic of new coronavirus pneumonia that broke out in Wuhan in December 2019 is beyond doubt a disaster especially for cancer patients. There are limited data on the clinical characteristics of cancer patients with SARS-CoV-2 infection, and treatments based on this aspect are rarely mentioned. According to relevant medical literature and websites, this article aims to summarize the immune status, chemotherapy, radiotherapy and endocrine therapy for cancer patients in the state of new coronavirus pneumonia infection, hoping to provide a reference for clinical practice.

Keywords: COVID-19; Cancer; Treatment; Administration

Besides SARS-CoV in 2002 and MERS-CoV in 2012, SARS-CoV-2 means the third large-scale outbreak of a coronavirus-related epidemic. As a new infectious disease, the novel coronavirus pneumonia was first reported in Wuhan City, Hubei Province on December 31, 2019, and it was widespread around the world [1,2]. On February 11, 2020, the International Committee on Taxonomy of Viruses (ICTV) named the virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The infected patients presented with pneumonia symptoms of unknown pathology, and the main clinical manifestations were fever, fatigue, dry cough, and maybe accompanied by symptoms such as runny nose, sore throat, chest tightness, vomiting and diarrhea. Some patients have mild symptoms, and a few patients have no symptoms or manifestations. This new respiratory disease is characterized by rapid human-to-human transmission and it has caused a worldwide pandemic [3]. There is no effective treatment or vaccine available currently. Moreover, current studies have shown that patients with new coronary pneumonia are still at risk of re-infection.

Since the World Health Organization (WTO) announced the outbreak of the new coronavirus as a pandemic [4], the impact of this rapidly spreading virus infection on cancer patients needs further exploration. Cancer patients are more susceptible to the virus than those who do not have cancer, because cachexia and anti-cancer treatment will put patients in a state of immunosuppression [5]. A retrospective analysis of the 2009 epidemic (H1N1) [6] found that cancer patients have a higher rate of pneumonia (66%) and the 30-day mortality (18.5%) is higher than ordinary patients. A series of recent studies have found that cancer patients with COVID-19 have worse results than those without cancer [5]. At present, there are few researches about management and treatment for cancer patients with COVID-19. For this reason, our article would like to provide a further overview of the treatment for cancer patients in the case of new coronavirus pneumonia.

A large amount of evidence indicates that cancer patients are the high-risk populations to COVID-19. Cancer patients are more prone to be infected, because they are usually in a state of immunosuppression due to the

chemotherapy, surgery and other anti-cancer treatment. In a study involving 1524 cancer patients, cancer patients were twice as likely to be infected with the new coronavirus as the common persons [3]. The Chinese Center for Disease Control and Prevention described the epidemiological characteristics of 72,314 COVID-19 cases on February 11, 2020. They reported that 107 patients (0.5%) were cancer patients and 6 of them died. Its fatality rate is 5.6%, which is higher than that in all COVID-19 patients (2.3%) [7]. Similarly, in a series of studies by Liang [5], cancer patients with COVID-19 are more likely to enter the ICU for mechanical ventilation (39% mortality of cancer patients, 8% mortality of non-cancer patients). The mortality rate of infected cancer patients in China is 28.6% [8], while the mortality rate of all COVID-19 patients is 2.3% [9].

According to reports, the ACE2 receptor is not only the binding site of SARS-CoV, but also the binding site of COVID-19 [10]. The interaction of SARS-CoV-2 with the Renin-Angiotensin-Aldosterone System (RAAS) through the ACE2 receptor is a key factor in infection [11,12]. So cancer patients have worse prognosis after SARS-CoV-2 infection because of their older age (in the United States, the average age of cancer patients is 66 years [13,14]), higher expression of ACE2 receptor (ACE2 receptor expression increases with ages [15]) and more basic diseases [16]. What's more, in the process of infection, some specific immune response is needed to eliminate SARS-CoV-2 [17]. However, cancer patients under early aggressive treatment or even under the condition of close observation, lymphopenia (an independent prognostic indicator of covid-19 [18]) is usually found, and the immune response is impaired [19]. In addition, low levels of immune response can lead to viral replication and tissue destruction, especially in some tissues with abundant expression of ACE2 receptor, such as lung, intestine and kidney [17]. Therefore, immune adjuvant therapy [8], like blocking cytokines and early antiviral therapy may be beneficial at this stage. It has been reported that in the case of chronic infection, tumor [20] or SARS-CoV-1 infection [21], continuous activation of the immune system will lead to lymphocyte depletion. Programmed Death-1 (PD-1), the markers of Cytotoxic T lymphocytes (CTL) and Natural Killer cells (NK) depletion, are much higher in COVID-19 infection than healthy controls [22]. The exhaustion of CTL may be related to the rapid propagation of the virus, which in turn leads to decompensation [23]. It is reported

that anti-PD-1 drugs have been successfully used to reduce the depletion of T cells by blocking PD-1 in response to viral, bacterial and fungal infections [13]. However, clinical trials of anti-PD-1 drugs for the treatment of COVID-19 are currently underway, and efforts are still being made to develop vaccines for COVID-19 [24]. However, the immune system damage caused by the virus may be difficult to reverse in immunosuppressed cancer patients, and even the effectiveness of the vaccine will be greatly reduced in cancer patients [25].

It is currently believed that in the use of anti-cancer drug therapy, especially the use of anti-cancer drugs that can cause lymphopenia and damage cellular immunity, so the risk of infection will increase, especially the use of alkylating agents (Cyclophosphamide, Phosphoramidate) or the long-term use of steroid drugs. At the same time, elderly patients and patients undergoing chemotherapy for more than half a year have corresponding risk. Moreover, blood system cancers are usually accompanied by reduced or abnormal immune cells, so the treatment for these patients requires more notice. There remains the problem whether should we delay or continue anti-cancer treatment during the epidemic? The current suggestion points out that the cancer treatment of patients should be divided into three possible risks: low, medium or high progress in anti-cancer treatment. Some types of tumors, such as lung and pancreatic cancer, acute leukemia, and highly aggressive lymphoma, diagnosis and active treatment should be carried out in time. For slow-growing cancerous diseases such as breast cancer and thyroid cancer, delayed treatment intervention can be considered. Such workaround should not affect the long-term efficacy and survival rate of patients. Of course, these suggestions should be applied with caution, and the application should be selected according to the protective conditions of medical institutions in the region. To this end, this article also hopes to provide research references for comprehensive treatment and management for cancer patients with new coronavirus infection from the following conventional treatments.

Chemotherapy

Cancer patients without metastasis

Febrile Neutropenia (FN) is a common side effect of chemotherapy myelosuppression. For cancer patients with febrile neutropenia (not more than 20%), the current research recommends the low-risk treatment [26], such

as Docetaxel/Cyclophosphamide (TC) regimen in the treatment of breast cancer. If this is not possible, Granulocyte Colony Stimulating Factor (G-CSF) is recommended. When using moderate risk regimens, such as Calcium Folate / 5-Fluorouracil / Oxaliplatin (FOLFOX6) regimen for colon cancer, G-CSF should be considered. Secondly, if feasible, it is suggested that the combined regimen can replace the single regimen. Thirdly, choosing low frequency, short course of treatment can reduce the length of hospital stay. Finally, if possible, the intravenous infusion can be changed to oral chemotherapy.

Cancer patients with metastasis

In this case, we need to set a standard for the effect of chemotherapy. If the survival rate can be improved and the patients' symptoms can be reduced, it is recommended to use the low toxicity single regimen. If the combined regimen selected, it is better to consider G-CSF support. On the other hand, if the chemotherapy regimen affects the survival rate of the patients, and treatment regimen had strong side effects or the patients are in poor condition, it should be considered to postpone the chemotherapy [27].

Endocrine Therapy

Since endocrine therapy generally does not have the effect of bone marrow suppression, these patients can continue with the original endocrine therapy (for example, tamoxifen for breast cancer, triptorelin for prostate cancer).

Targeted Therapy

Based on the degree of leukopenia, patients can be treated with molecular targeted therapy. In view of the inevitable side effects of molecular targeted therapy, it is necessary to constantly monitor the number of white blood cells during targeted therapy. If the white blood cells reduce less than 10%, molecular targeted therapy can be considered. Otherwise molecular targeted therapy needs to be stopped [28,29].

Radiotherapy

Radiotherapy depends on the patients' situation. In case of remission, alternative therapy should be considered if possible. And palliative radiotherapy should be selected according to WHO/ CDC guidelines if alternative therapy is not available [30,31]. At the same time, there are some situations where radiotherapy should be delayed. For example, a study [32]. pointed out that

adjuvant radiotherapy for breast cancer can be postponed to the 20 weeks without affecting the effect. In the same way, the author Pisansky [33] had also proved that the radiotherapy can even be extended to 28 weeks in patients with intermediate risk of local prostate cancer when they receive neoadjuvant endocrine therapy. In other cases, it is unreasonable to suspend radiotherapy in patients (for example, radiotherapy for squamous cell carcinoma of the head, neck and cervical cancer). In some cases of neoadjuvant therapy, radiotherapy is recommended according to WHO / CDC guidelines. In these situations, we should pay attention to the existence of cross infection. In conclusion, novel coronavirus pneumonia patients with cancer have worse clinical outcomes than normal patients. Comprehensive treatment and further research on cancer patients with new coronavirus infection are still an urgent need.

Conclusion

Currently, the novel coronavirus pneumonia is still a large challenge for cancer patients. When cancer patients are in the condition of weakened immune system, their chance of infection is several times that of ordinary people, so preventing infection is the key. If cancer patients in stable situation, we should consider delaying adjuvant chemotherapy or elective surgery. Secondly, during the epidemic period, we can popularize hand hygiene knowledge, infection prevention measures, high-risk exposure and clinical symptoms of COVID-19 infection to patients. Minimizing visitation can reduce exposure and infection. When cancer patients are infected with the COVID-19, especially elderly patients or patients with other comorbidities, monitoring or treatment should be strengthened. At the same time, active intervention is required for cancer patients, and chemotherapy and radiotherapy must be personalized. Although this article gives some recommendations and guidances on the management for cancer patients, it is still limited because it is only a theoretical summary. It needs further research on whether SARS-CoV-2 virus has some different characteristics in cancer patients and whether it will affect the development of cancer.

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Conflicts of Interest:

None.

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