



Organ transplantation management in the midst of the COVID-19 outbreak: a synopsis

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On December 8, 2019, the first case of unexplained pneumonia was reported in China, in Wuhan, Hubei Province (1). By March 6, 2020, over 100,000 confirmed cases of coronavirus disease 2019 (COVID-19), and more than 3,400 deaths have been reported worldwide (data from National Health Commission of the People's Republic of China, Official Channels of Hong Kong, Macao and Taiwan, and World Health Organization). COVID-19, which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is bound to have widespread ramifications on the clinical management system, organ transplantation being a prime example. Patients on the transplant waitlist are generally in poor condition. Moreover, post-transplant patients with weak immunity stemming from the long-term and regular administration of immunosuppressants are more likely to contract the SARS-CoV-2 infection than are healthy individuals. Thus, when considering transplant patient safety, balancing organ allocation principles with epidemic prevention and control is a dilemma for transplant teams.

The COVID-19 outbreak has endangered the administration of organ transplantation. Organ transplantation teams face the following risks: (I) the probability of cross-infection among coordinators multiplies. This owes to their increased exposure due to inevitable floating workplaces and subsequent frequent contact with latent COVID-19 patients. (II) Undiagnosed COVID-19 patients lurking among donors and recipients could infect transplant recipients and medical personnel. (III) Thanks to asymptomatic infected donors and recipients, the perioperative risk of SARS-CoV-2 infection

increases. This challenges the false-negative rate of real-time reverse transcriptase polymerase chain reaction tests for SARS-CoV-2 nucleic acid using samples collected from nasopharyngeal swabs (2) and the accuracy and convenience of existing means of detection. (IV) Recipients are apt to get infected postoperatively due to compromised immunity and increased hospital stays. (V) There is a shortage in the blood supply due to restricted blood donations and population mobility caused by COVID-19.

Our center has organized a multidisciplinary discussion referring to the characteristics of viral transmission and national epidemic prevention and control requirements. This will enable us to modify strategies and methods for organ transplantation in a timely manner. Donors, donor family members, recipients, recipient family members and medical personnel are the main control points. Based on pre-established protocols (3,4), we have issued a modified organ transplantation management synopsis for our center in the midst of the SARS-CoV-2 pandemic. This has entailed adjusting transplantation procedure management practices including donor and recipient screening, and donor, recipient, and perioperative management (*Table 1*).

On January 24, 2020, the People's Government of Sichuan Province initiated a first-level response to a public health event (COVID-19). At that time, our center conducted management and work in strict accordance with the synopsis (*Table 1*), and received 4 cases of organ donation following citizen death. The last case included was on February 6, 2020. All of the donors were male, with an average age of 39.5 years. They were all from Sichuan Province, and there was no history of epidemiological

Table 1 The organ transplantation management synopsis in the midst of COVID-19 prevention and control

Procedures	Management practices
Donor and recipient screening	(I) No contact history with suspected or confirmed COVID-19 patients, no residence history or travel history in Hubei Province, and no history of residence or travel in Hubei Province for persons in close contact over the past 30 days
	(II) No fever over the past 30 days
	(III) No signs of pneumonia according to CT
	(IV) No detection of COVID-19 nucleic acid via RT-PCR ^a
	(V)* No surgery is allowed to be performed in patients whose estimated transfusion volume exceeds the blood bank provision; patients with no history of surgery in the relevant surgical area and normal coagulation function are preferred
Donor management	(VI) Donors are transferred to respiratory intensive care unit for maintenance
	(VII) Donors are allowed to be accompanied by only one immediate family member (who must meet the conditions of Nos. I–III)
	(VIII) Donor maintenance personnel, coordinators, brain death identification personnel, and Red Cross staff are screened in accordance with “The Prevention and Control of Novel Coronavirus Pneumonia (Second Edition)” ^b
Recipient management	(IX) Recipients must arrive via private transportation
	(X) Recipients must be accompanied by only one relative (assuming Nos. I–III are met)
Perioperative management	(XI) Implementation of health management for related medical personnel
	(XII) Implementation of independent operating room and postoperative ward to prevent cross-infection among patients
	(XIII) Implementation of professional responsibility system and multidisciplinary treatment

*, Only for recipients; ^a, two consecutive negative results (at least one day apart); ^b, Available online: <http://www.nhc.gov.cn/jkj/s3577/202001/c67cfe29ecf1470e8c7fc47d3b751e88.shtml>. COVID-19, coronavirus disease 2019; CT, computed tomography; RT-PCR, reverse transcriptase polymerase chain reaction.

exposure. Their body temperatures had been normal over the previous 30 days, their chest CT images were normal, and they each had two consecutive negative nasopharyngeal swab results (at least one day apart). In total, 8 cases of organ transplantation were performed, including 4 cases of liver transplantation and 4 cases of kidney transplantation. There were 6 males and 2 females, with an average age of 48 years. The recipients had no history of surgery, all were from Chengdu, and none had had epidemiological exposure. Furthermore, they each had 30-day normal temperatures, negative CT findings and two consecutive negative nasopharyngeal swab results (at least one day apart). Transplantation was successful for all 8 patients, and 7 did not receive blood transfusions. All patients recovered without surgical or infection-related complications.

SARS-CoV-2's incubation period varies from 0 to 24 days, with a median of 3 days. However, SARS-CoV-2 remains contagious during the incubation period (5). To err on the side of caution, we took occult infection precautions by setting a 30-day interval before symptom

onset. This action has proven both useful and prescient. Ironically, our current knowledge of transmission route and pathogenic mechanisms of SARS-CoV-2 is just the tip of the iceberg. What remains beneath the water is what should be of primary concern, rather than what little is already apparent. For example, a team led by Zhong Nan-Shan, Professor at The First Affiliated Hospital of Guangzhou Medical University, recently detected SARS-CoV-2 in the fecal samples of four newly diagnosed COVID-19 patients (4). Additionally, SARS-CoV-2 was detected in the gastrointestinal tract, saliva or urine of another four patients with positive rectal swabs. SARS-CoV-2 was also detected in the impaired site of the esophagus in a COVID-19 patient (4). The full health implications of SARS-CoV-2 may exceed our imagination in terms of both its immensity and its insidiousness.

During the raging of SARS-CoV-2, transplant recipients are at the top of the list of the susceptible population. Throughout the history of organ transplantation, there is no precedent from which to learn. This understanding has led

to fledgling efforts to offer specific management practices to help transplant teams prepare and adapt. Even with the synopsis, plenty of fundamental work remains to be done. We believe the improvements outlined in this synopsis will safeguard the health of recipients and related medical personnel, and the resilience of our care delivery system being up against the SARS-CoV-2 pandemic. Although the epidemic in China has come under control (i.e., reduction in daily confirmed and suspected COVID-19 patients), we cannot ignore the myriad ways in which SARS-CoV-2 may undermine our clinical decision support system.

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Footnote

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