Impact of the coronavirus pandemic on role of HPB surgeons inTongji hospital，China

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Currently, more than 200 countries and regions are experiencing the coronavirus pandemic. As of April 30, 2020, more than 3 million people have been infected, and the death toll has reached more than 200,000. The pandemic has posed serious challenges to global healthcare systems. Under the extreme circumstance like this where hospitals are confronting overwhelming coronavirus infected patients and shortage of personal preventive equipment, the treatment of HPB patients is inevitably impacted to some extent. How to cope with this situation and allocate medical resources between coronavirus infected patients and HPB patients remains as a challenge to HPB surgeons. In the past four months, a number of strategies concerning HPB surgeons have been implemented in our hospital to deal with this situation. Here, we like to share with our colleagues in this regard.

General strategies for fighting against the coronavirus pandemic in Wuhan

Since the outbreak of pandemic, stopping its spread has been a top priority of the Chinese government. Since January 23, the city of Wuhan with a population of 11 million had been in lockdown for 76 days. During this period, the stay-at-home and community isolation were mandated. Any entry into or exit from Wuhan was forbidden except for urgent medical needs or epidemic prevention-related tasks, and the essential necessities of residents were delivered to homes by community workers and volunteers through online ordering systems.

China has implemented the policies of “early detection, early reporting, early isolation and early treatment” as well as “testing, isolating, hospitalizing and treating all who are in need”. All suspected and confirmed cases as well as those who had close contact with the confirmed cases in communities were identified and triaged with isolation in different designated places. In order to treat a large number of patients, two combat hospitals that were respectively named as Huoshenshan Hospital and Leishenshan Hospital were quickly constructed within 10 days, each of which has more than 1,000 beds. In addition, by designating more coronavirus-specific hospitals, more than 100,000 beds were created to accommodate coronavirus-infected patients in a short time. As a result, shortage of hospital beds was no longer an issue. The patients were initially

triaged based on the severity of their symptoms. Those in severe conditions were admitted to designated hospitals for treatment, and those with mild symptoms were sent to the makeshift hospitals for observation. Importantly, more than 42,000 healthcare workers belonging to 340 medical supporting teams from across the country joined in the battle against the coronavirus pandemic in Wuhan. They were dispatched to different hospitals, along with sufficient PPE and medical instruments such as ventilator, extracorporeal membrane oxygenation (ECMO) and mobile CT scanner, which significantly alleviated the stress caused by lack of sufficient medical resources in the early stage of the pandemic. These strategies played a key role in preventing the spread of the virus, increasing cure rate and reducing mortality rate in a severely affected area.

Role of HPB surgeons in fighting against the coronavirus pandemic

As the largest hospital in Wuhan where is the epicenter in China, Tongji hospital has been assigned as a designated hospital for accommodating severe COVID-19 patients. The inner structure and the working force of the hospital were subsequently modified to fit its new function. In the last four months, over 4000 medical personnel including HPB surgeons, joined in the battle against the coronavirus pandemic in the three separate branches of Tongji hospital. The hospital only reserved basic medical services for HPB patients and the patients with urgent medical conditions. Over 50% of HPB surgeons were assigned to support the isolation ward and the fever clinic. Some of them were assigned to the general wards and the intensive care units to reinforce the dispatched medical teams to treat the coronavirus patients under the guidance of the physicians of respiratory diseases and intensive care units. Our HPB surgeons were required to live in the requisitioned hotels to avoid a potential nosocomial transmission. Working hours were strictly limited to ensure the physical and mental health of our HPB surgeons.

More than 80% of severe coronavirus patients were associated with underlying medical conditions, such as HPB tumors, liver transplant recipients, portal hypertension, etc. Some of them had developed severe HPB complications, such as liver function impairment, cholecystitis, liver abscess and pancreatitis, which required the assistance of HPB surgeons. As a part of multidisciplinary team, a HPB task group consisting of experienced HPB surgeons was set up to deal with the HPB-related situations of the coronavirus patients. A liver transplant recipient who suffered from the virus infection was completely recovered from his severe condition after multidisciplinary treatment supported by the HPB task group and others. Our HPB task group also performed an ultrasound-guided percutaneous drainage for the coronavirus patients who suffered from

the liver abscess. Moreover, We shared our experience in nutritional support for severe patients with other physicians. With the joint efforts, the mortality rate of severe coronavirus patients in Tongji Hospital was kept at the lowest one in Wuhan.

Strategies of HPB surgeons in treating HPB patients

For treatment of HBP diseases under the circumstance of the pandemic, a series of technical guidance and regulations had been set up to minimize the impact of the pandemic on the treatment of HPB patients. Firstly, since the middle of January, we have attempted to shorten the length of patient's hospital stays in order to make more beds and staff available to deal with an increasing number of severe coronavirus patients. In this regard, we tended to choose nonsurgical treatment as a temporary measure if it was possible. Microwave or radiofrequency ablation was preferentially chosen for the patients with a single HCC smaller than 5cm in tumor diameter, because their efficiency is similar with resection. For a large or multiple HCC, the patients were initially given a transcatheter arterial chemoembolization (TACE) along with molecular targeted treatment, aiming to temporarily control the progression of the diseases. Secondly, scientific prevention training program was provided to every HPB surgeons and nurses. All staffs were required to take body temperature, wear masks and protective coveralls as well as keep social distancing. Patients were required to stay in ward except the need to go out for examinations. Thirdly, the HPB ward was divided into isolated observation wards and general wards. New patients were required to take the coronavirus nucleic acid and serological tests as well as chest CT scan before admission. The suspected or confirmed cases were mandated to be transferred to designated hospitals. Those who were tested negative before admission should stay in an observation ward for 5-7 days until the second test confirmed negative. Any visit from patient's relatives was not permitted. Fourthly, by setting up online services, patients were able to consult with our surgeons, and then surgeons could make an online prescription. The drugs were subsequently sent to the patients by hospital through the parcel express. Our online medical service is very effective in providing medical supports to HPB patients and reducing hospital visits during the lockdown period. Lastly, for the patients with urgent surgical condition who had no time to wait for test results of the virus or transfer, such as patients with massive bleeding from a ruptured HCC and TACE was not indicated, operation had to be performed immediately under the extremely strict protection. After operation, the patient had to stay in an isolation ward until the potential coronavirus infection was excluded.

Protection strategies for HBP surgeons

Firstly, the HPB center has established a leading group for coronavirus prevention and control to guide the protection training of all HPB surgeons and nurses. Clinical activities such as ward rounds, case discussions and academic conferences were partially transformed into online communication. All staff members were required to take the nucleic acid, serological tests and chest CT scan before starting to work, and right after that their body temperatures were monitored everyday. If someone's body temperature is higher than 37.3°C, it will be reported and further tests on the virus will follow. All surgeons and nurses were required to wear masks, coveralls and gloves, and social distancing and hand hygiene measures were strictly implemented.

Through the joint efforts of the government, medical workers, volunteers and Wuhan residents, the epidemic situation in Wuhan was quickly brought under control. As of April 26, the last confirmed coronavirus patient in Wuhan was cured and discharged from hospital. After months of combating the virus, China is now restarting its economy, reopening schools and gradually returning to normality. Tongji hospital has started to resume its normal clinical and scientific activities. As the coronavirus is still spreading in a large number of countries, HPB surgeons in some other countries would be likely facing the similar difficult situation we have experienced. We hope that our experience is helpful to our HPB colleagues in fighting against this deadly virus. We believe that if we join together, we will win the battle.