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## MINI REVIEW

# Recommendations on diagnosis and treatment in hepatobiliary surgery under 2019-nCoV epidemic



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**Summary** 2019 novel coronavirus pneumonia is a serious life-threatening disease and it has affected many people globally, especially the people who live in China. A high prevalence of hepatobiliary diseases has been observed in 2019-nCoV patients and some may require emergency surgery. In the context of the novel coronavirus pneumonia, new challenges have arisen for surgeons in terms of ways to effectively treat outpatients, safety of medical staffs in performing surgery treatment, and the lack of efficient postoperative management and follow-up procedure. It is hoped that through this article, surgeons will have a better system in hepatobiliary diseases classification, treatment selection, and protective measures to improve the clinical practice in accordance with the guidelines for the diagnosis and treatment of the novel coronavirus pneumonia.

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At present, the 2019-nCoV epidemic situation is being actively combated worldwide. We, as hepatobiliary surgeons, should also attach great importance to the prevention and control of the epidemic situation. Through the writing of this article, we will make everyone more

vigilant in clinical work, standardize operations, and scientifically control the spread of the SARS-CoV-2 virus.

At the end of 2019, a novel coronavirus (2019-nCoV) infected pneumonia was first discovered and diagnosed in Wuhan, China [1,2]. It has then spread throughout China and even to surrounding countries and regions. On February 11, 2020, World Health Organization (WHO) named the novel coronavirus pneumonia "COVID-19" (corona virus disease 2019, 2019-nCoV), and the International Virus Classification Commission named the virus SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2, SARS-CoV-2) [3,4].

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2019-nCoV is an enveloped, non-segmented, positive-sense, single-stranded RNA coronavirus. Its particles are round or oval, with a diameter from 60 nm to 140 [3]. It is a novel coronavirus belonging to the  $\beta$  genus, the same group as SARS-CoV. Polygenetic analysis of this virus indicates it originated from bats, but whether there was an intermediary animal host is not yet known. Some studies have suggested that pangolins, minks, and snakes might be the intermediate hosts. At present, the way in which 2019-nCoV infects cells is not yet clear. Studies have shown that 2019-nCoV shares 86.9% homology with bat SARS-like coronavirus (bat-SL-CoVZC45, MG772933.1) [3,5,6], which further confirms it may originate from bats that are close to bat SARS-like. It is speculated that 2019-nCoV predominantly attacks patient's respiratory system through binding to angiotensin-converting enzyme 2 (ACE2) receptors, which are similar to the bat-like SARS, and can cause respiratory infections, diarrhea, and even multiple organ failure.

There are clear evidence that 2019-nCoV is a human-to-human transmission disease [7]. The main source of infection is from infected patients, and asymptomatic infection has been reported as well. The virus is transmitted mainly through droplets, contact, and possibly through fecal and aerosol routes. The incubation period for most patients is 1 to 14 days, but some patients exhibited a longer incubation period [8–10]. Since asymptomatic transmission can occur during the incubation period, it challenges the medical professions in terms of how to minimize infection while still treating infected patients.

Hepatobiliary disease is common and frequently occurring disease in the elderly. Most hepatobiliary diseases are associated with metabolic disorders, and the 2019-nCoV virus has been shown to have a detrimental effect on liver function, and sometimes can cause severe conditions and even death in patients [11]. Under the pressure of new pneumonia epidemic, surgeons must rethink ways to overcome the lack of medical protective equipment and effective methods to treat 2019-nCoV patients with hepatobiliary disease. This article was written based on the author's years of experience in diagnosis and treatment of hepatobiliary disease, combined with the relevant guidelines for the diagnosis and treatment of 2019-nCoV.

## Hepatobiliary disease diagnosis and treatment process flow during the epidemic

During 2019-nCoV epidemic, the diagnosis and treatment process flow of hepatobiliary disease is needed to be strictly enforced. This is because medical professions can be exposed to the virus as a consequence of poor diagnosis process. Therefore, we standardized the procedures for outpatients and hospitalization for hepatobiliary surgery during epidemic 2019-nCoV, according to the hepatobiliary surgery and 2019-nCoV diagnosis and treatment guidelines (Fig. 1):

- first, reducing human mobility and exposures are the keys to control infectious diseases. The First Affiliated Hospital of the University of Science and Technology of China is the first "smart hospital" in China. Starting January 1, 2020, the "Full Course Management-Smart Online" consultation service was launched to solve patients' problem

through telemedicine. The online appointment system is also adopted, briefly, information such as basic medical process and the clinic that they will be visiting will be provided during online appointment. The most important step in distinguishing between 2019-nCoV and general pneumonia is the patient's epidemiological history. Therefore, it is critical to talk with patient and learn about their epidemiological history. The national "Coronavirus Pneumonia Diagnosis and Treatment Plan" clearly states that the epidemiologic risks of 2019-nCoV include [12]: a history of travel to or residence in Wuhan and surrounding area cities in the last 14 days before symptom onset; history of contact with 2019-nCoV infected persons (positive nucleic acid test) within 14 days before the onset; previous contact with patients from Wuhan City and surrounding areas in the last 14 days before symptom onset; or epidemiologically connected to 2019-nCoV infections or clustered onsets;

- second, it is necessary to enforce the pre-examination and triage of outpatient clinics. Patients with fever and/or respiratory symptoms are the priority in clinical manifestations. If patient's body temperature, blood test, liver and kidney function, and nucleic acid tests are normal, an additional CT testing is required for patient with liver and gallbladder diseases. A chest CT examination can be performed during the abdominal examination, without increasing patient's examination time. If the CT results are normal, medical professions can rule out the possibility of 2019-nCoV and admit the patient to ward for further diagnosis and treatment [5,13,14]. On the other hand, if the patient developed fever, the patient should only be admitted to the ward once the medical professions exclude the patient from 2019-nCoV using fever diagnosis. If the patient is diagnosed or suspected to be pneumonia at the fever diagnosis, it is recommended to transfer the patient to 2019-nCoV designated hospital for further diagnosis and treatment.

## Hepatobiliary surgery classification during epidemic period

Hepatobiliary disease has a wide range of symptoms and different stages. During the epidemic period, it is necessary to classify patients accordingly based on their symptoms to ensure they can receive appropriate diagnosis and treatment. We divided the surgery into three categories: elective, limited, and emergency surgery. The severity of patient will determine the type of surgery treatment that they are going to receive.

### Elective surgery

Elective surgery is a surgery that is scheduled in advance because it does not involve a medical emergency. The scheduling of the surgery will not have impact on the treatment and recovery process. Most hepatobiliary surgeries fall into this category if acute abdomen such as biliary infection does not occur.

During the 2019-nCoV epidemic, in order to save medical resources and reduce the exposure between medical staffs and patients, hospitals should advise patients to

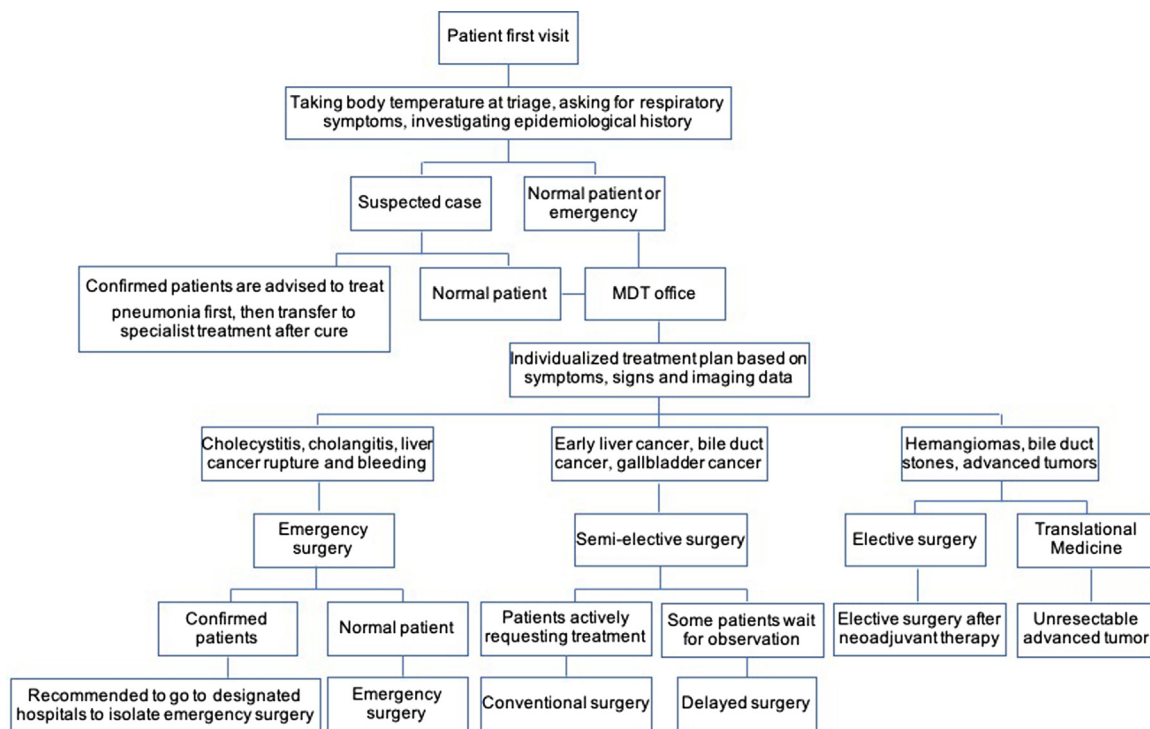


Figure 1 Diagnosis and treatment process of patients with hepatobiliary diseases during 2019-nCoV epidemic.

reschedule their non-medical emergency surgery. During the rescheduling process, hospitals can provide psychological counseling to patients, advised patients to consume light diet to prevent the induction of biliary pancreatitis, and take prescription to prevent aggravation of symptoms.

### Semi-elective surgery

Semi-elective surgery means the scheduling of an operation is relatively flexible, but there is a certain time frame and should not be delayed too long, such as radical mastectomy of various malignant tumors in hepatobiliary disease. For such limited-term surgery, multidisciplinary discussions are highly recommended, transformation or neoadjuvant treatment should be utilized as much as possible. Once the patient's condition is under control and 2019-nCoV epidemic are stable, further surgical treatment can be considered. If surgery is really needed, the next phase of surgery is to ensure the radical tumor principle.

### Emergency surgery

Emergency surgery is one that must be performed immediately without delay and it is necessary to save the patient's life. Emergency surgery in hepatobiliary disease mainly includes acute suppurative cholecystitis, severe cholangitis, rupture and bleeding of liver cancer, and so on. Under these circumstances, the hepatobiliary surgeon needs to act and judge the condition as accurately as possible. For example, to treat patients with purulent cholecystitis and biliary tract infection, the pus should be removed in a timely manner and strengthen the anti-infective treatment. During the surgery,

endoscopic treatment can also be used to monitor abdominal conditions and liver function of the patient. Active surgical intervention should be provided to patients in case of tumor rupture and bleeding. Surgical preparations should be made in accordance with the guidelines for the diagnosis and treatment of 2019-nCoV and the basic principles of surgery [15].

### Type of hepatobiliary surgery during epidemic

Under the pandemic trend of 2019-nCoV, the severity and emergency operations for hepatobiliary diseases should be tailored to local conditions to minimize exposure.

### Open surgery

During the 2019-nCoV epidemic, patients who are excluded from 2019-nCoV disease and required limited-term or emergency surgery can have open surgery. However, it is important to reduce the operation time, medical staffs' exposure, and the impact of pneumoperitoneum on lung expansion. In the consideration that asymptomatic transmission can occur during the long incubation period, it is recommended to use anesthesia intubation under general anesthesia to reduce the exposure risk of anesthesiologist. A one-time use filter can be placed between the tracheal intubation and breathing circuit to reduce contamination of the breathing circuit.

## Endoscopic surgery

During 2019-nCoV outbreak, laparoscopic surgery has the advantages of being more rapid and comprehensive in the exploration of the abdominal cavity in emergency and limited hepatobiliary surgery. This specific surgical method should be accessed according to the hospital and intraoperative conditions. Hospitals with advanced technology can also perform robotic endoscopic surgery to reduce the exposure risk between medical professions and patients.

## Perioperative precautions

Once the operating room receives an alert of a suspected or confirmed new type of coronavirus infection, it is necessary to prepare the room in accordance with the three types of isolation protocols, droplet, air, and contact isolation, and provide level three protection accordingly. During the operation, in addition to the preservation of patient specimens, blood, secretions, and excreta, additional attentions are also needed in tracheal intubation, sputum suction, and aerosols that generated during the use of electrosurgical equipment. When equipped with the electric burner, the power should be adjusted to the acceptable minimum, smoking device can also be used to suck out the smoke at any time and minimize the aerosol diffusion. A thorough disinfection and proper disposal of disposal items after the surgery are needed to prevent contamination.

## Postoperative care and follow-up

The concept of early rehabilitation analgesia and early eating accelerated rehabilitation surgery for patient's recovery is mainly based on the condition of 2019-nCoV. The hospital should prohibit patient sitter as much as possible. In situation where patient sitter is necessary, it is very important to monitor the health and the schedule of the patient sitters. Also, it is necessary to establish and enforce a strict registration system for patient sitters. More effort should also be invested in the online follow-up. By doing so, doctors can communicate with patients through online system and offer video guidance for some simple tasks such as drainage bags replacement [16].

## Conclusion

In a nutshell, the diagnosis and treatment of hepatobiliary disease during the outbreak of 2019-nCoV introduced in this article is based on the author's years of experience in diagnosis and treatment of hepatobiliary disease, as well as the summary of the guidelines for the treatment of hepatobiliary disease and the diagnosis and treatment of 2019-nCoV. It is hoped that this article will relieve some of the burdens for medical staffs who are involved in hepatobiliary surgery, to assist medical staffs to provide appropriate diagnosis and treatment to patients while minimizing the spread of 2019-nCoV as much as possible between medical staffs and patients. This article also emphasizes the importance of following the diagnosis and treatment process flow and preserve valuable medical resources at this critical

moment. This review has several limitations, for example, there are still unknown factors regarding 2019-nCoV and it is an on-going epidemic. However, it is hoped that this article will shed a light on medical professions who are involved in patients with 2019-nCoV and hepatobiliary disease, to assist medical staffs to provide appropriate diagnosis and surgery treatment to patients while minimizing the spread of 2019-nCoV, and to preserve limited medical resources for life-threatening patients.

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## Disclosure of interest

The authors declare that they have no competing interest.

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