

Experience of Diagnosing and Managing Patients in Oral Maxillofacial Surgery during the Prevention and Control Period of the New Coronavirus Pneumonia

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The newly emerged coronavirus disease (COVID-19) is a respiratory disease caused by a novel coronavirus (2019-nCoV) which was first identified in China in December 2019. It is a highly contagious infection that can spread from person to person through close contact and respiratory droplets. The healthcare personnel of the Department of Oral and Maxillofacial Surgery are especially vulnerable to the infection due to their extensive and close exposure to patients' oral and nasal cavities and secretions. As one of the busiest specialised hospitals in the world, the Department of Oral and Maxillofacial Surgery of Peking University School and Hospital of Stomatology summarised the experience with disease prevention and control and clinical recommendations on the examination, diagnosis and treatment processes, clinical management, healthcare personnel protection and disinfection amid the continued spread of the pandemic.

Key words: *diagnosis and treatment process, new coronavirus, oral and maxillofacial surgery, protection*

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In December 2019, a respiratory disease outbreak caused by a new coronavirus in Wuhan, China, was reported and has now become a worldwide pandemic. With the continual research and increased understanding of the virus, the World Health Organisation and the Ministry of Health of the People's Republic of China have officially named it 'novel (new) coronavirus 2019 (2019-nCoV)' and the disease, 'COVID-19'. Generally, the population is susceptible to the infection; it is thought that the virus spread mainly from person to person through respiratory droplets and close contact transmission, or through direct contact with blood and body fluids of infected patients. COVID-19 is thought to be highly contagious despite its long incubation period and unspecific symptoms^{1,2}. The healthcare personnel of

the Department of Oral and Maxillofacial Surgery are particularly vulnerable to the infection of COVID-19 due to their close exposure to patients' oral and nasal cavities and body fluids in routine clinical practice³. Although reported cases have been steadily declining, the risk of infection cannot be completely eliminated from daily medical and dental practice. Thus, prevention and infection control procedures are particularly important among healthcare providers. Based on the experience of the Department of Oral and Maxillofacial Surgery of Peking University School and Hospital of Stomatology in the past month, this article discusses the experience of disease prevention and control and clinical recommendations on the examination, diagnosis and treatment processes, clinical management, healthcare personnel protection and disinfection amid the epidemic.

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The admission process

Amidst the COVID-19 outbreak, patients should be categorised according to the urgency and severity of the disease and interventions, while the screening and risk assessment of COVID-19 should be strengthened to prevent unnecessary exposure for healthcare providers⁴.

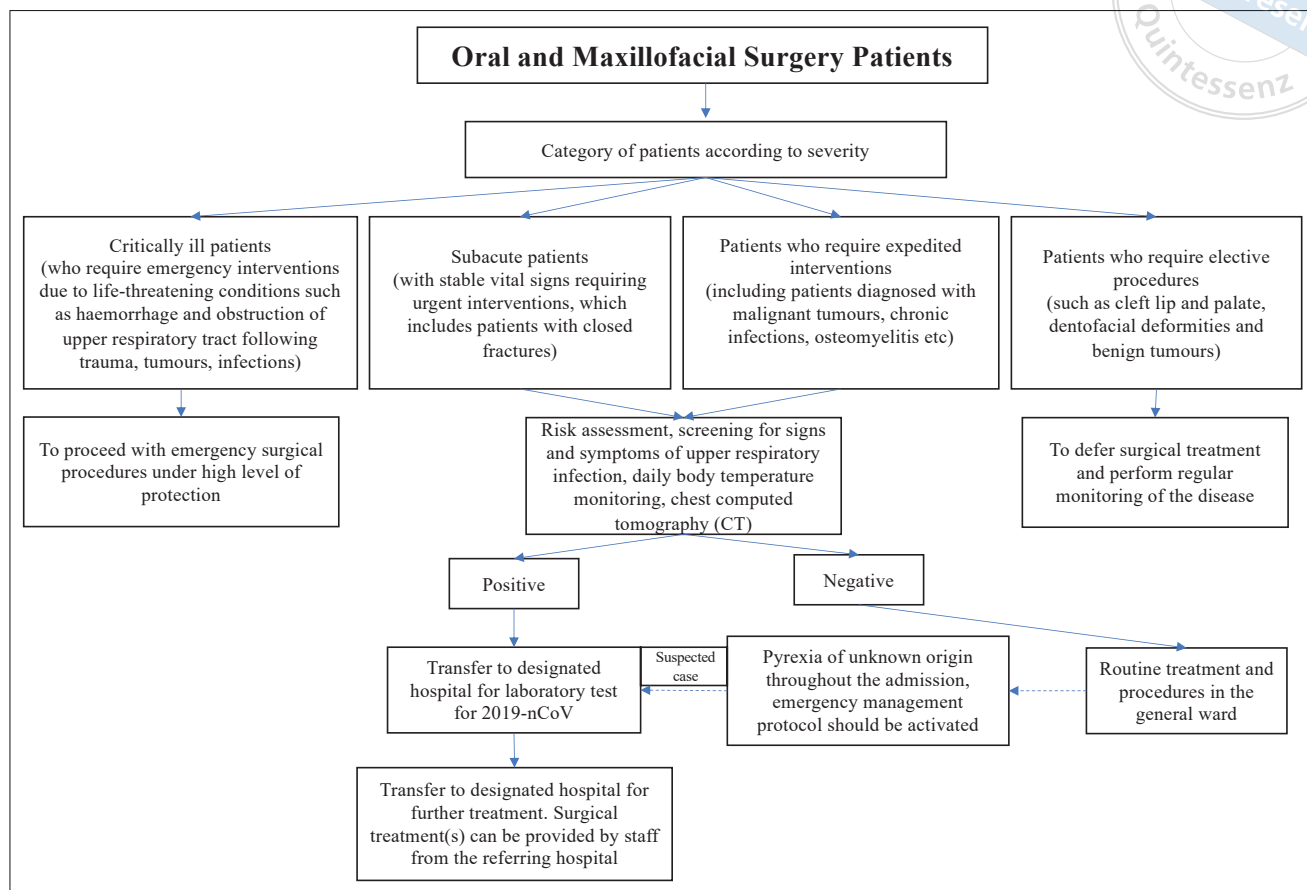


Fig 1 Algorithm of diagnosis and treatment for patients categorised according to the urgency and severity of the disease and interventions.

- Patients who require elective procedures, such as cleft lip and palate, dentofacial deformities and benign tumours are advised to defer the procedures.
- Patients who require expedited interventions, including patients diagnosed with malignant tumours and chronic infections: a complete risk assessment is necessary prior to admission, including a full blood count, serum biochemistry, chest radiograph and preanesthetic assessment. A lung computed tomography (CT) scan and laboratory testing for 2019-nCoV should be performed if indicated. A Hospital Admission Application and Declaration form of Peking University School and Hospital of Stomatology (PKUSS) should be signed by patients and family members if the screening yields negative results and there is no recent history of fever and respiratory symptoms prior to hospitalisation.
- For critically ill patients who require emergency interventions due to life-threatening conditions such as haemorrhage and obstruction of upper respiratory tracts following trauma, tumours, infections, all

healthcare providers are required to adhere to strict prevention and infection control protocol in addition to the practice of routine universal precautions.

- In subacute patients with stable vital signs requiring urgent interventions, which includes patients with closed fractures, non-life-threatening orofacial infections, or odontogenic infections, screening for COVID-19 and preoperative assessments are necessary to prevent unnecessary exposure to 2019-nCoV. It should be noted, however, that the types and patterns of pyrexia in patients who suffer from maxillofacial trauma and/or infections can be distinguished from those due to COVID-19 through thorough history taking, clinical examination, laboratory testing and radiographic investigations.
- The algorithm of diagnosis and treatment for patients categorised according to the urgency and severity of the disease and interventions is shown in Figure 1.

Hospital and surgical management

- During the outbreak, transport of inpatients within the hospital should be strictly limited to inpatient transfer elevators to avoid potential cross-infection of COVID-19. Patients should be placed in well-ventilated single rooms, the doors of which should be kept closed at all times, and entry and exit should be kept to a minimum. Each room should be equipped with lavatories and sinks. Healthcare facilities should include sufficient hand hygiene supplies such as alcohol-based hand sanitisers.
- Visitors should be restricted and screened for symptoms of acute respiratory illness prior to entering the healthcare facilities. If patient escort services are required, only one escort is allowed. Screening, risk assessment and daily body temperature monitoring of the escorts should be performed. Patients, visitors and the escort (if present) should be instructed regarding the strict adherence of hand hygiene protocol and the use of personal protective equipment (PPE) such as surgical masks throughout the admission. Both patients and visitors should be instructed to limit their movements within the facilities and if the patients are scheduled for investigations outside the compound, such as for a CT scan, medical personnel should be alerted for their transfer via patient elevators.
- Due to the recent COVID-19 outbreak, the supply of blood and blood products as well as multidisciplinary and critical care support may be affected. Thus, it is recommended that treatment plans should be kept as simple as possible while adhering to the treatment principles⁴.
- It is recommended that patients be closely monitored for 3 to 7 days after strict screening upon admission to ensure that they are in optimal health prior to scheduling surgery.
- For patients who are not adequately screened prior to admission due to acute and severe illness, surgical procedures should be scheduled in the negative pressure operating theatre (-5 Pa or less). Staffing policies should be implemented to minimise the number of healthcare providers.
- The healthcare facility should be equipped with isolation rooms with an adequate supply of personal protective equipment (PPE) and hospital-grade disinfectants for the management of suspected COVID-19 cases.
- COVID-19 diagnostic protocol should be applied for patients presented with pyrexia of unknown origin (PUO) or symptoms of upper respiratory tract infections. If there are suspected COVID-19 cases, emer-

gency management protocols should be activated, and patients transferred to designated hospitals for COVID-19; isolation and treatment are required since the dental hospitals do not fulfil the stipulated criteria for management of COVID-19 cases.

Protection of healthcare personnel

According to the ‘Technical Guidelines for Use of Personal Protection Equipment for Healthcare Personnel for COVID-19 (Trial)’ issued by the Ministry of Health of the People’s Republic of China⁵, the procedures, interventions, infection control and protective measures can be divided into three categories based on the risk of exposure (Table 1).

Suction aspirators are recommended in irrigation procedures (wound irrigation and oral irrigation) to prevent splashing.

Disinfection and infection control management

According to the WST-512-2016 Guidance of Environmental and Surfaces Cleaning, Disinfection and Infection Control in Hospitals⁶, the wards of the Oral and Maxillofacial Surgery unit can be divided into three areas based on the risk of infection:

- Low-risk areas: facilities not accessible by patients, including doctors’ and nurses’ lounges.
- Medium-risk areas: areas accessible by normal and stable patients, mainly referring to the general ward and doctors’ office.
- High-risk areas: infected or contaminated areas or isolation areas for highly susceptible individuals, such as operating theatres, intensive care units (ICU)/ post-anaesthesia care units (PACU), isolation rooms.

The cleaning and disinfection policy and practice for different levels of risk areas are shown in Table 2.

Terminal cleaning and disinfection should be performed in high-risk areas in case of admission of suspected or confirmed COVID-19 cases:

Spray with 3% sodium hypochlorite solution → contact time of approximately 30 minutes → regular cleaning and disinfection with 1000 mg/l chlorine-containing compounds → repeat spraying with 3% sodium hypochlorite solution → contact time of approximately 30 minutes → allow to air dry.

Management of follow-up patients

Patients who have undergone oral and maxillofacial surgery often require regular follow-up postoperatively.



Table 1 Classification and protection of common procedures in oral and maxillofacial surgery.

Risk of exposure	Types of contact and exposure	Relevant procedures	Personal protective equipment										
			Hand hygiene	Scrubs	Surgical caps	Surgical masks	Respirators	Gloves	Disposable gowns	Hazmat suit	Face shields/ eye goggles	Plastic disposable overshoes	
Low risk	Indirect contact	Health education, history taking, ward rounds, preoperative consent taking	•	•	•	•							
Moderate risk	Direct contact with patients. Non-aerosol-generating invasive procedures	Physical examination, fine needle aspiration, injection, electrocardiogram (ECG) monitoring, wound dressings, nebulisation	•	•	•	•			•			•	
High risk	Normal patients with contact and exposure to aerosol and body fluids	Nasopharyngeal and oral suctioning, dental treatment, incision and drainage, wound irrigation, use of rotary handpiece system, nasogastric tube or urinary catheter insertion	•	•	•	•	○		•	○		•	○
	Aerosol-generating upper respiratory tract procedures in PUI	Endotracheal intubation, tracheostomy, airway suctioning in patients who are not adequately screened prior to admission due to acute and severe illness or suspected COVID-19 cases	•	•	•		•		•	•	○	•	○

• Recommended; ○ Selection based on risk of exposure.

However, amid the COVID-19 outbreak, patients are advised to defer the regular review visits but to followup through phone calls, video calls or online consultations. Appointments can be scheduled if the above-mentioned alternatives are not feasible.

Case discussion

The patient was a 46-year-old female who worked as a bus ticket collector. She was allegedly involved in a motor vehicle accident on 14 February 2020 and sustained right zygomatic arch fracture. She was categorised into the group of ‘subacute patients’ and the rou-

tine screening and risk assessment for COVID-19 were performed. They revealed no recent history of contacts with the infected areas for COVID-19 and, despite her occupation, she was considered to pose moderate to high risk. A chest radiograph, full blood count, serum biochemistry and other blood investigations were within normal limits, as was her body temperature. She was then admitted to the ward for further management.

After close monitoring for 3 days in the ward, an open reduction and internal fixation (ORIF) of the right zygomatic arch fracture was performed with strict adherence to personal protective measures (moderate-to high-risk category). Her vital signs remained stable

Table 2 Cleaning and disinfection policy and practice.

Risk of infection	Methods	Frequency (per day)	Agents/disinfectants
Low risk areas	Use detergent and water for cleaning	1 to 2 times	Water
Intermediate risk areas	<ol style="list-style-type: none"> 1. Clean floors with chlorine-containing disinfectants; contact time of approximately 30 minutes is recommended. 2. Contact time of approximately 10 to 30 minutes is recommended for surfaces disinfection followed by cleaning with water. 	1 to 2 times	500 mg/l chlorine-containing disinfectants
High risk areas	<ol style="list-style-type: none"> 1. Clean floors with chlorine-containing disinfectants; contact time of approximately 30 minutes is recommended. 2. Contact time of approximately 10 to 30 minutes is recommended for surfaces disinfection followed by cleaning with water. 3. Thorough cleaning and disinfection after each clinical procedure, the subsequent clinical or surgical procedures can only be carried out after terminal cleaning and disinfection of the operating theatre. 	> 2 times	500 mg/l chlorine-containing disinfectants

All contaminated areas or surfaces (by body fluids, blood, body waste or secretions) are to be promptly cleaned and disinfected.

postoperatively. At postoperative day 4, she complained of chills and rigors, accompanied by body aches, with intermittent coughs. However, there were no signs and symptoms of nasal blockage, sore throat, or dyspnoea. Upon examination, her body temperature was 37.4°C and elevated to 38.6°C after 1 hour, and there was no improvement despite the administration of oral non-steroidal anti-inflammatory drugs (NSAIDs).

The patient's body temperature remained below 37.0°C the next morning, but she started to present with signs and symptoms of upper respiratory tract infection such as cough, runny nose, nasal blockage and sore throat, but with no dyspnoea. There were no significant abnormalities seen on the urgent chest CT scan. Her full blood count revealed a white cell count of $3.3 \times 10^9/l$ and a percentage of lymphocytes of 17.5%. The possibility of viral infection could not be ruled out following consultation with the respiratory medicine team. The screening for influenza A and B viral infection was performed and reported negative results. The emergency management protocol for COVID-19 was activated and reported to the regional centre for disease control (CDC). The regional designated hospital for COVID-19 was then contacted immediately for patient transfer and the 2019-nCoV test. The patient was transferred according to the transfer protocols and terminal cleaning and disinfection were performed on all touched surfaces and hospital environment. Simultaneously, screening for healthcare providers who had had close contact with the patient was performed under the guidance of the CDC. A total of 52 healthcare professionals appeared to have

had close contact with the patient. They were placed in isolation for close surveillance and body temperature monitoring. Compulsory isolation was terminated as the laboratory tests for 2019-nCoV and clinical presentation were negative.

Analysis of the case

Although there was no recent history of contact with the infected areas for COVID-19 upon screening prior to admission, attention should be drawn to the patient's occupation as a bus ticket collector. Thus, a moderate- to high-risk surgical procedure was performed after close monitoring for 3 days following admission. She presented with flu-like symptoms with fever at postoperative day 4, and the symptoms of the upper respiratory tract infection worsened the following morning. A viral infection could not be ruled out in view of the patient's blood investigation results, despite the negative findings of the chest CT scan. Further investigations were carried out to exclude the possibilities of influenza A and B. The emergency management protocol for COVID-19 was activated and reported to the regional CDC, and the patient fulfilled the criteria for COVID-19 screening. The regional designated hospital for COVID-19 was then contacted immediately for patient transfer and a 2019-nCoV test. As mentioned above, the algorithm of patient admission during the COVID-19 outbreak proved to be practical and feasible.



Conflicts of interest

The authors declare no conflicts of interest related to this study.

Author contribution

Drs Yue YANG and Hui Yuh SOH collected the data and drafted the manuscript; Prof. Zhi Gang CAI designed and supervised all the procedures and critically revised the manuscript; Profs. Xin PENG and Yi ZHANG took part in the discussion and provided valuable suggestions; Prof. Chuan Bin GUO designed the study. (Received Feb 29, 2020; accepted Mar 3, 2020)

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