

ENT Emergency Management Protocol for COVID-19 Lockdowns

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1. ABSTRACT

1.1. Objectives: The first outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was reported in Wuhan, China, in December 2019. The disease caused millions of deaths and became a global threat. Otolaryngologists are at a high risk of infection because they perform numerous aerosol-generating procedures. Although our hospital shut down the outpatient department, reduced the number of selective surgeries performed, and converted our ear, nose, and throat (ENT) ward into a quarantine ward, ENT emergencies are inevitable. Risk cannot be reduced to zero, we can only seek to minimize it. therefore, we propose a set of protocols for managing ENT emergencies.

1.2. Study Design: Retrospective review.

1.3. Subjects and Methods: We set up an ENT emergency referral protocol and implemented it during the lockdown in Taiwan implemented between May 10 and August 1, 2021. For our primary outcome, we aimed to prevent the spread of COVID-19 among our staff. We also examined 355 ENT emergency referral cases that were seen between February 15 and August 1, 2021, at a single tertiary medical center in Taiwan.

1.4. Results: We enrolled 355 patients who sought emergency ENT consultation between February 15 and August 1, 2021 at the Department of Otolaryngology, Shin-Kong Wu Ho-Su Memorial Hospital, Taipei, Taiwan. None of our ENT staff were infected by SARS-CoV-2 during the lockdown; on August 9, 2021, all COVID-19 polymerase chain reaction tests, which were conducted through nasal swabbing, yielded negative results. The difference in admission rates before and during the lockdown was nonsignificant (13.79% *vs.* 17.07%, $P=.25$). However, the mortality rate at the hospital significantly increased during the lockdown (0.86% *vs.* 4.88%, $P=.024$).

1.5. Conclusion: The COVID-19 crisis has drastically changed the emergency room consultation patterns for ENT problems. Thus far, a specific protocol has not yet been developed for the management of ENT emergencies by ENT surgeons during the COVID-19 outbreak in Taiwan. Through a summary of the current literature and

recommendations for COVID-19 management, we established a flowchart-based protocol that ensures the safety of ENT clinicians and enhances the efficacy of ER consultations.

2. Keywords: ENT emergencies; COVID-19 pandemic; Vaccination; Protocol settings

3. INTRODUCTION

The first outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was reported in Wuhan, China, in December 2019. COVID-19 has been a global threat since 2020, and it has infected more than 250 million people and caused more than five million deaths worldwide. Numerous countries have introduced various measures to prevent the spread of COVID-19, including epidemic prevention policies, public health advocacy and education, new medical center practices, and vaccine universalization. Taiwan was the first nation to inform the World Health Organization (WHO) of the human-to-human transmission potential of the novel coronavirus.^[1] Furthermore, Taiwan was also the first to implement proactive measures against the novel coronavirus, introducing more than 130 policies relating to public health, personal protective equipment resources, and medical center care units. The social distancing model is considered the most successful strategy for controlling the spread of COVID-19. The next most successful policy was the mask-rationing plan, which ensured that masks are fairly and equally distributed to the public. The integration of health information technology with a robust health care infrastructure and advance planning enabled Taiwan to prevent the local spread of COVID-19 for more than 200 consecutive days, that is, no domestic cases were reported.

However, on April 20, 2021, a COVID-19 outbreak, which started with a pilot from China Airlines, was reported in Taiwan. Subsequently, a series of domestic cases were confirmed in the weeks that followed, and this led to the implementation of a nationwide level 3 lockdown by the Taiwan Central Epidemic Command Center.

The spread of COVID-19 becomes increasingly difficult to control once it starts to increase within a country, and this phenomenon can be attributed to three main reasons. First, SARS-CoV-2 has variable transmission routes and vague presenting symptoms. A transmission can occur not only through respiratory droplets but also through the fecal-oral route and even conjunctiva.^[2] The COVID-19 virus can survive in an environment for up to 3 hours in aerosols, up to 24 hours on porous surfaces, and up to 72 hours on smooth surfaces.^[3] Furthermore, according to the Centers for Disease Control and Prevention (CDC), the most commonly reported symptoms include cough, fever or chills, fatigue, sore throat, muscle or body aches, new loss of taste or smell, and congestion or runny nose, and most of these symptoms are nonspecific and can be easily misdiagnosed as common cold or other influenza infections.

Second, Taiwan's self-complacency with respect to its COVID-19 protocols also played a crucial role. Taiwan reduced the length of quarantine required for non-vaccinated flight crews from 5 to 3 days. However, the incubation period of SARS-CoV-2 is between 4 and 5 days on average, and the onset of the first symptoms may occur within 2 to 11 days after infection.^[4] Therefore, infected individuals may find it difficult to remember the locations that they visited. Moreover, the illicit nature of the teahouses in the red-light district of Taipei also increased the difficulty of contact tracking. Taiwan's government subsequently implemented a "real-name" tracking system and "no

gathering” policies. Consequently, the situation was brought under control, and the spread of COVID-19 was considerably reduced.

Finally, lack of vaccines and absence of an antidote were major concerns for the people in Taiwan. At that point, all of the countries that were performing well in terms of managing COVID-19 were implementing COVID-19 vaccination. Although vaccines were already available by then, the quantity of vaccines that Taiwan could obtain was far less than the numbers required to vaccinate the public. Taiwan’s vaccination program prioritizes high-risk groups such as older adults, pregnant women, and people with comorbidities. In August 2021, the COVID-19 vaccination rate in Taiwan was approximately 10%, and domestic vaccines were not yet approved for use at that time, which necessitated the lockdown period to be extended. In addition, the course and severity of the disease was unpredictable. The term “happy hypoxia” is used to describe the rapid progression of the disease, which caused hundreds of deaths, surpassing the death toll of the SARS outbreak in 2002. The infected group is getting younger, thereby reducing the life expectancy of the people.^[5]

Because of the aforementioned reasons, a nationwide level 3 lockdown was implemented between May 17, 2021, and July 27, 2021. The COVID-19 crisis had a substantial effect on the work of otolaryngologists and put them at considerable risk. The viral load of COVID-19 mostly exists in the nasopharynx and oropharynx.^[6] Aerosol-generating procedures and local treatments put ear, nose, and throat (ENT) surgeons at a high risk of infection. In response to the situation, we recommended the suspension of all nonessential/nonemergent ENT examinations and procedures during the pandemic, the reduction of patient admission rates, and the shutdown of the outpatient department, with the aim to reduce the exposure of our clinicians and other staff to the COVID-19 droplets.^[7] At the Department of Otolaryngology, Shin-Kong Wu Ho-Su Memorial Hospital, Taipei, we reduced the admission rates for elective surgeries and outpatient department visits. We also converted our ENT ward into a dedicated COVID-19 ward to expand the COVID-19 capacity of the hospital.

However, ENT emergencies inevitably occur, and this is a major challenge for ENT surgeons that requires a timely solution.^[8] Life-threatening ENT diseases and conditions include a compromised airway, head and neck malignancies, and craniomaxillofacial trauma. The CDC guidelines recommend that during social interactions, individuals should maintain a distance of 6 feet away from each other and interact for no more than 15 minutes.^[9] Although symptomatic patients are tested through antigen and polymerase chain reaction (PCR) tests, some infected individuals are asymptomatic, and false-negative results are sometimes reported.^[10] Antigen and PCR tests involving nasal swabbing have an accuracy rate between 80% and 85% when they are conducted in medical centers; by contrast, the accuracy rates of these tests are lower when they are conducted in regional hospitals or screening stations because the nasal swabbing procedure is operator-dependent. An operator must be familiar with the anatomy of the nasal cavity, and to obtain a sufficient amount of secretion sample, the swab must enter either nostril at an angle that is parallel to the nasal floor and pass through the common meatus to touch the nasopharynx.^[11]

A protocol for ENT management that is adapted to the COVID-19 pandemic has yet to be published. Therefore, we propose a protocol for ENT emergency management that not only protects patients but also prevents COVID-19 infections among ENT clinicians.

4. MATERIALS AND METHODS

4.1. Patient population

Data were retrospectively collected at a tertiary medical center (i.e., Department of Otolaryngology, Shin-Kong Wu Ho-Su Memorial Hospital, Taipei, Taiwan) between February 15 and August 1, 2021; this time included a level 3 lockdown period that lasted from May 17, 2021, to July 27, 2021. The data were collected from patients who sought ENT consultation at the emergency department of the medical center. The collected data comprised patient demographics, diagnoses, COVID-19 test results, laboratory and radiology findings, acute management, disease progression and outcomes, admission rates, and mortality rates.

We retrospectively divided all the patients into two groups by applying the cutoff time point of May 10, 2021, which was the day after we announced a joint commitment policy with the emergency department in response to the COVID-19 pandemic and established our management protocol. The level 3 lockdown was announced a week after May 10, 2021. In accordance with our pandemic ENT consultation protocol, the emergency department attending would screen all patients (who were seeking ENT consultation) at a triage station and decide whether a patient required emergency management by otolaryngologists. If the screened patient required emergency management, a COVID-19 rapid test or PCR test would be ordered depending on the severity and urgency of the patient’s condition. Otolaryngology survey and management procedures would only be performed after a negative COVID-19 test result was obtained.

Four otolaryngology residents and five attending physicians were responsible for providing ENT emergency department consultation services under a daily rotation system, and each ENT ER consultation case would be reviewed every Monday at a morning meeting conducted by the department.

4.2. Protocol settings

The otolaryngology–emergency joint management protocol was established on May 10, 2021 (Figure 1).

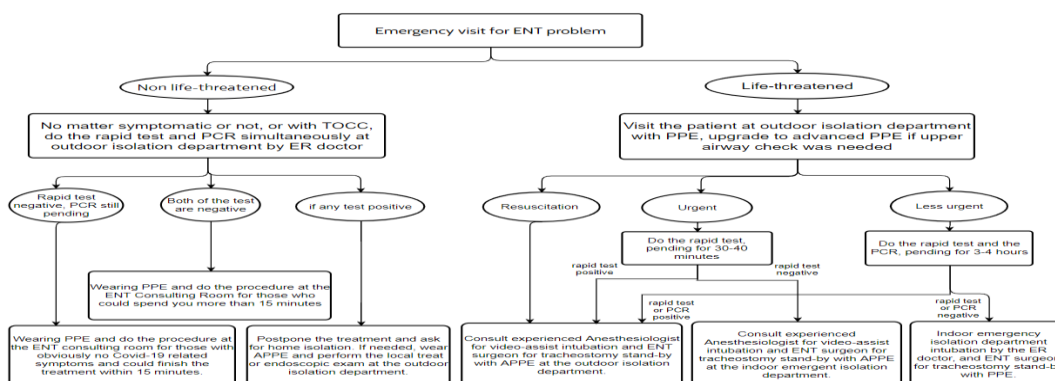


Figure 1: This is the protocol for ENT emergency. Once otolaryngologists were consulted, we followed this flowchart to treat the patient during Covid-19 crisis.

TOCC: travel history, occupation, contact history, and cluster history

PPE: personal protective equipment

APPE: advanced personal protective equipment

PCR: polymerase chain reaction

We designed two sets of personal protective equipment for all ENT emergency consultations. The first set comprises basic Personal Protective Equipment (PPE), which consist of double face masks (N95 mask covered with surgical mask), disposable gloves, eye protectors, Association for the Advancement of Medical Instrumentation (AAMI) Level 1 isolation gowns, shoe covers, and hair covers. The second set comprises advanced personal protective equipment (APPE), which consist of double face masks (N95 mask covered with surgical mask), double disposable gloves, eye protectors, AAMI Level 3 coveralls, shoe covers, and hair covers.^[12] APPE provide more protection than PPE, and they can be used in situations that are more urgent and critical. Otolaryngologists can select either of these two sets of PPE depending on the nature of the ENT emergency referral that they are handling.

Our emergency department separates the patient visiting area into indoor and outdoor isolation areas. The outdoor isolation area is located from across the main hospital building, and it is isolated from the clinics and in-patient areas of the hospital. However, the outdoor isolation area lacks a negative-pressure environment, a suction system, electrocautery tools, and air conditioning, and the absence of these features increases the difficulty of performing resuscitations in this area (Figure 2A). If immediate resuscitation is required, the outdoor isolation area can provide a temporary and safe isolation area with essential life-sustaining equipment that experienced emergency physicians and otolaryngologists can use. By contrast, the indoor isolation area is better equipped (Figure 2B). It has a front room that is separated from the ward and used for the disinfection and storage of PPE clothing. Furthermore, the ward has a negative-pressure environment and is equipped with a high-efficiency particulate air (HEPA) filter system. This improved monitoring system was installed to enhance the effectiveness of life-saving procedures.

Patients who are waiting for their COVID-19 rapid test or PCR test results are isolated in the outdoor observation area. Each emergency department patient is treated as a COVID-19 carrier until a negative PCR and the rapid test result is obtained.



Figure 2A: Outdoor isolation area.



Figure 2B: Indoor isolation area.

All ENT emergencies are categorized into two major groups, namely life-threatening and non-life-threatening. For life-threatening ENT emergencies that require immediate resuscitation, emergency physicians will consult ENT surgeons and anesthesiologists and immediately establish an airway at the outdoor isolation area. Otherwise, COVID-19 PCR or rapid antigen testing is required for all emergency patients prior to the performance of any aerosol generating procedure or management. The COVID-19 PCR and rapid antigen tests differ in terms of test sensitivity and waiting time for results. Relative to the rapid antigen test, the PCR test has a higher sensitivity rate, but at least 3 to 4 hours are required to obtain the results. For most critical emergency cases that require immediate survey and management, a rapid antigen test should be performed first, and after ENT surgeons wearing APPE have evaluated a patient and confirmed that immediate resuscitation is not required, a PCR test can then be performed.

Because of the spreading pandemic and shortage of medical equipment, we had to develop a protocol that maximized the time and cost efficiency of treatments. For individuals with non-life-threatening conditions who are seeking ENT emergency consultation, PCR testing is a time-consuming and personnel-intensive process. Hence, the maximization of resource utilization and minimization of infection risk are crucial. According to CDC recommendations, the risk of infection can be reduced by maintaining a social distance of no less than 6 feet and ensuring that each person-to-person interaction lasts no more than 15 minutes.^[13] Thus, we used a procedure time of 15 minutes as the cutoff point for classifying the severity and complexity of diseases in relation to the risk of COVID-19 transmission. For procedures and management measures that require less time (<15 minutes), only negative rapid antigen test results are required. For otolaryngological survey and management procedures that require more than 15 minutes to complete and usually lead to advanced surgical treatment or admission, PCR testing must be performed for emergency patients. This classification system not only prevents infections among emergency physicians and otolaryngologists but also reduces the wastage of medical resources.

For disinfection protocols, all the used ENT tools are collected and fully sterilized.^[14] Large-sized instruments such as video equipment and treatment tables are disinfected once every hour with 95% alcohol, and endoscopes are soaked in Ortho-phthalaldehyde (OPA) for 12 minutes and then exposed to ultraviolet light for 30 minutes after each patient visit.

4.3. Outcome setting

For our protocol, the primary outcome is the occurrence or nonoccurrence of SARS-CoV-2 infections among the staff members in our ENT department after the implementation of the protocol during the lockdown. The secondary outcome is the changes to the number of ENT emergency referrals, admission rates, urgent surgical management indicators, death rates, and ENT emergency consultation patterns.

4.4. Statistical analysis

All data are presented as percentages or numbers. SPSS version 17.0 was used for statistical analysis. Comparisons of categorical variables were performed using Chi-Squared Test. A P value of less than 0.05 was considered statistically significant.

5. RESULTS

We enrolled 355 patients who sought ENT emergency consultation at our center (Department of Otolaryngology, Shin-Kong Wu Ho-Su Memorial Hospital, Taipei, Taiwan) between February 15, 2021, and August 1, 2021. After the implementation of the consultation protocol on May 10, 2021, no SARS-CoV-2 infection was reported among our ENT staff members (including physicians, nurses, medical technologists, audiologists, hospital runners, and cleaning staff). All COVID-19 PCR results obtained through nasal swabbing on August 9, 2021, were negative, indicating that the our desired primary outcome was achieved.

Table 1 summarizes the collected data. A total of 232 ENT consultation cases that were seen before the lockdown were compared with 123 cases that were seen during the lockdown. Admission rates did not differ significantly between the pre-lockdown and lockdown periods (13.79% *vs.* 17.07%, $P=.25$). However, relative to the pre-lockdown period, the mortality rate during the lockdown period was significantly higher (0.86% *vs.* 4.88%, $P=.024$). These findings can be attributed to the following reasons.

Table 1: Referrals data before and during lockdown.

Category of the ENT emergency	Lockdown period 0510-0801			Before lockdown 0215-0509			P value
	Refer case	Admit case	Death case	Refer case	Admit case	Death case	
Life threatened disease							
Suspected/confirmed airway compromised	6	6	0	6	4	0	
Head and neck cancer with/without complications	13	8	5	17	7	2	Admit: 0.129 *Mortality: 0.043
Inhalation injury	0	0	0	9	3	0	
Corrosive injury	0	0	0	2	1	0	
In totals	19	14	5	34	15	2	Admit: 0.557 *Mortality: 0.030

Non-life threatened disease							
Aerosol generation risk							
Deep neck infection, peritonsillar abscess, parotiditis with abscess	11	5	0	13	12	0	*Admit: 0.003
Other upper airway infection ^a	10	1	0	21	1	0	
Epistaxis	10	0	0	24	0	0	
Foreign body ingestion	48	0	0	85	0	0	
Craniomaxillofacial trauma	1	0	0	5	2	0	
Others ^b	7	0	0	7	2	0	
In totals	87	6	0	155	17	0	Admit: 0.136
Non-aerosol generation risk							
Dizziness or Vertigo	10	0	0	32	0	0	
Ear problem(AOM, COM, AOE, ISSNHL, Ramsay hunt syndrome)	7	1	1	11	0	0	
In totals	17	1	1	43	0	0	

*: Significant difference (P < .05)

a: Includes tonsillitis, facial cellulitis, adenoiditis, lymphadenitis, and pharyngitis.

b: Includes postsurgical complications, vocal palsy, hemoptysis, and dysphagia.

We examined the collected medical records and discovered that the number of immediate airway establishment procedures performed during the lockdown period was similar to that recorded during the pre-lockdown period. For tracheostomies, all personnel must wear APPE. Suction and electric cauterization were avoided to prevent droplet-based transmissions. No tracheostomy failure or severe post-procedure complications were reported. However, for emergency referrals involving patients with HNC, a higher admission rate (41.2% vs. 61.5%, P= .129) and a significantly higher mortality rate (11.8% vs. 38.5%, P=.043) were recorded during the COVID-19 lockdown than before the lockdown. Because the load of the ENT outpatient clinics was reduced, patients with HNC could not make regular follow-up visits to our outpatient department. We discovered that, during the lockdown period, these patients with HNC only sought emergency consultation when their condition was already severe. Three cases of mortality involved patients who presented to the Emergency Room (ER) with massive tumor bleeding. Although immediately resuscitation was successfully performed for these patients, they subsequently experienced rapid tumor progression and multiple organ failure, leading to death in the days that followed.

Among the patients with deep neck infections, almost all of them required prompt incision and drainage, and they were admitted for intravenous antibiotic treatment before the COVID-19 lockdown. However, relative to the pre-lockdown period, the admission rate for deep neck infections significantly decreased during the pandemic period (92.3% vs. 45.5%, P=.003). This was because most of the wards in the hospital were converted into dedicated COVID-19 wards, and the lack of non-COVID beds resulted in considerable changes to our ENT emergency management.

We prescribed broad-spectrum intravenous antibiotics with dexamethasone administration for deep neck infection patients and avoided performing incision and drainage procedures if they were in a stable condition. These patients were closely followed up at the ER observation area for at least 24 hours, and those with consequent oral form antibiotics and medication were discharged if their symptoms improved. No ER revisit or mortality was reported for deep neck infection cases during the lockdown period.

With respect to non-life-threatening conditions, **Table 2** lists the common ENT diseases that can be treated within 15 minutes by a qualified otolaryngologists (**Table 2**). During the COVID-19 lockdown, our protocol not only protected our medical staff from COVID-19 infections but also maximized medical resource utilization. The 15-minutes limit for person-to-person interactions was implemented in accordance with CDC guidelines. The protocol covers most scenarios relating to ENT emergency referrals, but for exceptional situations that require more time to handle, ENT procedure should only be started after the confirmation of negative PCR results.

Table 2: Categorization of ENT emergency cases for which urgent management is not required.

Conditions that can generally be treated or assessed within 15 min or through nonaerosol generating procedures	Could need more than 15 minutes, had to wait until PCR test negative
<ul style="list-style-type: none"> ➤ Foreign body ingestion through the nose or throat ➤ Ear-related problems^a ➤ Simple trauma that only requires dressing or suturing^b ➤ Peripheral vertigo ➤ Simple epistaxis that only requires education 	<ul style="list-style-type: none"> ➤ Foreign body in esophagus of a child ➤ Peritonsillar abscess ➤ Deep neck infection ➤ Epistaxis with active bleeding ➤ Hoarseness, lumpy throat ➤ Dysphagia with undetermined cause ➤ Complication or likely new diagnosis of head and neck cancer ➤ Corrosive/inhalation injury

a: Includes idiopathic sudden sensorineural hearing loss, ear infections, Ramsay hunt syndrome, and ear trauma.

b: Includes nasal bone fractures, facial bone fractures, and facial abrasion wounds.

6. DISCUSSION

COVID-19 has been raging worldwide since 2020, and Taiwan successfully prevented the spread of the pandemic for a long period. The first COVID-19 outbreak in Taiwan occurred in April, 2021 because of the government’s decision to loosen lockdown restrictions for flight crews. Furthermore, Taiwan’s government failed to obtain a sufficient quantity of COVID-19 vaccines for its population. In August 2021, the vaccination rate in Taiwan was only approximately 10%, and it was initially only made available to older adults and high-risk personnel (e.g., medical staff). Otolaryngologists who perform aerosol generating procedures on a daily basis are at a high risk of COVID-19 infection. Therefore, the establishment of a management protocol for ENT emergency referrals is crucial for protecting otolaryngologists and creating a safe working environment for medical staff.

In general, four categories of ENT emergency patients do not require immediate evaluation by otolaryngologists, namely patients with compromised airways, patients with head and neck malignancies, patients with inhalation or corrosive injuries, and patients with craniomaxillofacial trauma. An appropriate protocol is crucial for ER physicians and otolaryngologist who must handle these critical situations.

After the implementation of our protocol during the COVID-19 lockdown, the number of inhalation or corrosive injury and craniomaxillofacial trauma cases significantly decreased. This finding suggests the success of the government lockdown measures, which included travel restrictions, home quarantine requirements, public event and gathering restrictions, school closures, and the prohibition of indoor dining.

By contrast, the incidence of compromised airways did not change during the lockdown. With respect to tracheostomies for confirmed or likely carriers of COVID-19, Bier-Laning *et al.*^[16] summarized the tracheotomy protocols that were implemented during the COVID-19 pandemic in more than 26 countries.^[17] Almost all of the reviewed protocols propose the minimization of the number of personnel (only essential personnel should be present), the use of PPE, and the establishment of negative pressure room or installation of portable HEPA filters. For tracheostomy procedures, most of the protocols recommend the avoidance or minimization of cauterization and suctioning because of the risk of further generating aerosol.^[18] For tracheostomy tube changes, most protocols recommend that such procedures should be avoided, postponed, or suspended until a patient is tested negative for COVID-19 infection.^[19]

During the COVID-19 lockdown, a nursing home cluster infection involving 60 cases occurred close to our hospital. Most of the infected patients were sent to our hospital for management, and one of them was referred to our ENT department for a tracheostomy renewal. We examined the patient at the outdoor isolation area while wearing APPE that included a portable endoscope and headlamp. Because the patient did not exhibit any problem that required immediate airway management, we postponed the procedure by 2 weeks and conducted PCR testing.

In response to the pandemic, we postponed all elective surgeries and reduced the number of outpatient clinic visits.^[20] Clinical services were reserved for patients with urgent diseases for which medical care was required.^[21] Our ward was also converted into a dedicated COVID-19 ward for patients with confirmed COVID-19, and some of our residents were deployed to provide care for patients with COVID-19. Thus, identifying methods for reducing the number of elective surgeries and noncritical admissions is an essential topic. Stansfield *et al.* reported a significant reduction in the number of ER admissions for epistaxes and tonsillar infections in the United Kingdom during the pandemic.^[22] Specifically, seven out of the 52 study patients revisited ERs for recurrent epistaxis, and only one of them required admission because of social problems. Furthermore, adherent patients can remove non-dissolvable packing by themselves during a virtual consultation.

For the peritonsillar abscess group, Stansfield reported a reduction in number of aspiration procedures performed from 100% in 2019 to 7% in 2020 (during the lockdown).^[22] Meanwhile, intravenous broad-spectrum antibiotics and dexamethasone were administered during ER observations, and subsequent oral antibiotics were prescribed after discharge. Similar treatment outcomes without notable complications were reported during our study period. In our study, almost all of the patients with deep neck infections underwent incision and drainage and were admitted for

intravenous broad spectrum antibiotics treatment (12 out of 13 patients, 92.3%) before the lockdown. Only one patient was not admitted due to personal issues, but she visited our outpatient department for wet dressing during the days following her treatment, and she took a full course of oral form antibiotics regularly. However, we had reduced the admission rate for patients with deep neck infections during the lockdown period.

For deep neck infections, we relied primarily on imaging studies (eg, computed tomography) instead of oral or endoscopic examinations.^[23] We also avoided performing incision and drainage procedures if a patient's airway was not compromised. Broad spectrum antibiotics and dexamethasone were administered for patients with deep neck infections, and we kept them in the ER observation area for between 12 and 24 hours. If the clinical condition of a patient improves, they are discharged from the ER with subsequent oral antibiotics. No ER revisit for deep neck infection was reported during the lockdown period.

However, relative to the pre-lockdown period, the mortality rate at the hospital significantly increased during the lockdown period (4.88% *vs.* 0.86%), and most of the patients who died were survivors of HNC. Relative to normal individuals, patients with HNC are more vulnerable because of their immunocompromised status and are thus more likely to be infected with COVID-19.

Our observations revealed that the symptoms and medical conditions of the survivors of HNC who visited the ER during the lockdown were considerably more severe relative to pre-lockdown period.^[24] This situation also made it more difficult for otolaryngologists to examine patients with HNC and perform procedures at the ER because they had to wear double layer face-masks and heavy APPE.

Because of social stigma, survivors of HNC are less motivated to seek medical help, and the COVID-19 isolation policy prevented numerous HNC caregivers from assisting patients with HNC during the lockdown.^[25,26] Patients with HNC require regular ENT follow-up for cancer surveillance, which is conducted through physical examinations and endoscopy studies.^[27] During the COVID-19 lockdown, most patients with HNC postponed their ENT appointments and skipped regular checkups. This might have led to delayed cancer diagnosis and management, which in turn resulted in tumor progression with unfavorable prognosis that could have contributed to the increase in the mortality rate of the hospital.^[28,29] Several cases of newly diagnosed HNC were also detected through ENT emergency consultation (3 out of 13 patients) during the lockdown. With the spread of COVID-19, people were hesitant to visit hospitals. Hence, individuals who were at high risk of HNC would postpone their hospital appointments and neglect their symptoms during the lockdown.

Furthermore, numerous countries have not yet implemented nationwide vaccination, and the new delta and omicron coronavirus variants are already starting to spread. These factors increase the transmissibility of COVID-19, resulting in more severe illnesses and reducing the effectiveness of existing vaccines.^[30-34] Hence, effective protocols for the pandemic must be established.

7. CONCLUSION

The COVID-19 pandemic has substantially changed the consultation pattern for ENT emergencies, which will still occur and must be managed even during the pandemic. Thus far, a specific protocol has not yet been developed for

otolaryngologists who must manage ENT emergencies during the COVID-19 outbreak. Through a summary of the current literature and recommendations for COVID-19 management, we established a protocol for otolaryngologists that enhances the safety and efficacy of ENT emergency management.

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