

Care of Patients With a Laryngectomy During the COVID-19 Pandemic

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Abstract

Patients with a laryngectomy are at increased risk for droplet-transmitted diseases and, therefore, COVID-19, which has now caused a worldwide pandemic. Adaptive measures to protect patients with a laryngectomy and their families were designed and implemented in the Hong Kong SAR (HK). Driven by the fear of severe acute respiratory syndrome in 2003, hospitals in HK have since modified infection control routines to prevent a repeat public health nightmare. To face COVID-19, caused by SARS-CoV-2, we have adapted guidelines for our patients with a laryngectomy. Contact precautions, droplet precautions with physical barriers, and hand and equipment hygiene are our mainstays of prevention against COVID-19, and sharing these routines is the aim of this article. The COVID-19 pandemic is still roaring ahead. Awareness and precautions for patients with a laryngectomy who may be at higher risk are outlined here and should be maintained during the current pandemic.

Keywords

laryngectomy, laryngectomy stoma, COVID-19, Hong Kong, head and neck cancer, ENT, otolaryngology, otorhinolaryngology, oncology

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This global pandemic of COVID-19, caused by SARS-CoV-2, had yet to reach its peak. At the time of writing, 3,480,000 people were infected in >210 countries, resulting in >240,000 deaths worldwide according to data from the World Health Organization (WHO).¹ Medical professionals and citizens alike are still adjusting to this major public health issue.

Hong Kong SAR (HK) faced SARS in 2003. It was an outbreak from SARS-CoV-1, which was imported from mainland China and infected 1750 HK citizens, resulting in 286 deaths.^{2,3} Learning from the past, we revised our medical routines to adapt to the threat of COVID-19. Some were measures to protect our health care workers and preserve previous medical resources in anticipation of a lengthy fight.

Within our specialty of otorhinolaryngology-head and neck surgery, there have been broad guidelines evaluating tracheostomy and surgical precautions during the current

pandemic.^{4,5} Unlike patients with an intact upper aerodigestive tract, patients with a laryngectomy have an intact nasal cavity and nasopharynx, which have the potential to be infected or harbor a high viral load, in addition to a stoma, which lacks a filter for the virus. This orifice provides an additional route for contracting COVID-19 during this pandemic. In this article, we discuss some details of the adaptations and precautions that we have prepared for our patients with a laryngectomy in HK.

Experience of SARS in HK

In 2003, the index case in HK had landed at our hospital, the Prince of Wales Hospital. At least 88 health care workers and 18 medical students were infected. Since the etiology was not known at the time, cases were triaged to be suspicious of SARS based on clinical symptoms or history of close contact. Suspected cases were handled with airborne precautions. Eye protection was also worn in some units.⁶ Even then, severe outbreak in the public hospitals was unavoidable. This might be due to the use of a nebulized bronchodilator in the index patient, creating infectious aerosols. Procedures thought to increase the risk of disease transmission included other aerosol-generating procedures, such as airway suctioning, bronchoscopy, and endotracheal intubation.

SARS was predominantly transmitted through close person-to-person contact via respiratory droplets produced when an infected person coughs or sneezes.⁷ The Centers for Disease Control and Prevention postulated that the SARS virus might have spread by airborne transmission.⁶ Therefore, patients had to wear N-95 masks once symptoms developed, and they were immediately placed in isolation negative-pressure rooms. Health care workers wore N-95 masks with head covers, goggles, waterproof gowns, and gloves when caring for suspected or confirmed cases of SARS. Daily and terminal disinfection with hypochlorite solution (1000 ppm)

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was thorough, with emphasis on careful washing of beds, handrails, bedside tables, floors, and equipment. A closed suction system was employed in patients who were intubated, to avoid air leak and subsequent release of infectious aerosols. Health care workers had to present themselves to hospitals if suspicious symptoms developed, rather than putting the whole family at risk. It was advised for doctors in the community to wear a N-95 mask when seeing any patient with respiratory symptoms. Positive contacts of patients with SARS were advised to isolate themselves until the incubation period was over. Hand hygiene was emphasized after contact with patients with respiratory symptoms.⁴

In a patient with a laryngectomy, the stoma multiplied the risk of infection due to an additionally exposed respiratory tract mucosal membrane. Virus traveling by droplets could land directly into the trachea and lower respiratory tract through the stoma. There have been suggestions for postoperative care for patients with head and neck cancer; however, there is no current protocol for care of patients postlaryngectomy.

Given the increased risk of COVID-19 infection in patients postlaryngectomy, it would be extremely important to emphasize an infection control protocol for them. A video on postlaryngectomy care was made in conjunction with the New Voice Club of Hong Kong to educate these patients on COVID-19 (Supplementary Video S1).

Protocol for Care of Laryngectomy Stoma in COVID-19

Social Distancing

Social distancing and maintaining a high level of hygiene will protect not only the patients but also their families. According to a study done in 2012 on cough aerosols with 45 healthy nonsmokers, droplets $<10 \mu\text{m}$ account for up to 99% of the total number of droplets that are expelled as a bioaerosol during coughing.⁸ The WHO recommended staying at least 1 m (3 ft) from other people, while the Centers for Disease Control and Prevention suggested at least 2 m (6 ft). Mass gatherings and exposure in crowded places should be avoided.^{1,9}

Hand Hygiene

Hand hygiene is known to be an important intervention measure as part of standard precautions for a pandemic crisis such as SARS and avian influenza in the general public, general ward, as well as intensive care setting.^{10,11} A meta-analysis of 30 studies in a community setting suggested that the use of nonantibacterial soap with hand hygiene education interventions is efficacious in preventing gastrointestinal and respiratory illnesses.¹² The indications for hand hygiene in the health care setting include before and after touching the patient; before handling an invasive device for patient care, regardless of whether gloves are used; after contact with body fluids or excretions, mucous membranes, nonintact skin, or wound dressings; while moving from a contaminated

body site or another body site during care of the same patient; after contact with inanimate surfaces and objects in the immediate vicinity of the patient; and after removing sterile or nonsterile gloves. Therefore, additional attention to hand hygiene must be paid by patients with a laryngectomy, their home carers, and health care workers in otorhinolaryngology during stoma care. The 7 steps in hand washing include (1) rubbing palms together, (2) rubbing the back of both hands, (3) rubbing hands together with fingers interlaced, (4) rubbing the backs of interlocked fingers, (5) rubbing each thumb in a rotating manner followed by the area between the index finger and thumb, (6) rubbing fingertips in the palm of each hand, and finally (7) rubbing both wrists in a rotating manner. The whole process should last at least 20 seconds before rinsing hands under running water until clean. Use the elbow or a paper towel to turn off the tap, and then dry the hands thoroughly with a single-use towel.¹³ Alcohol-based hand rubs with optimal antimicrobial efficacy usually contain 75% to 85% ethanol, isopropanol or n-propanol, or a combination of these products. The WHO recommends formulations containing either 75% vol/vol isopropanol or 80% vol/vol ethanol when water and soap are not available.¹³

Physical Barriers

A face mask should be worn when going out. It should be worn even when socializing indoors, if possible, when away from home. It is recommended to wear a face mask with hydrophobic and droplet-filtering properties, such as the classic 3-ply mask. When a face mask is worn, the metal wire should be fitted to the nasal bridge and molded until it seals the contour of the nasal bridge completely. Patients should be vigilant to avoid touching the external surface of the mask after putting it on or during its removal and to perform hand hygiene after disposal of the mask.

Stoma hygiene is the basic daily routine in patients with a laryngectomy. The patients and their relatives learn the technique before discharge, which should not be overlooked. In addition, wearing a laryngectomy apron, stoma filter with microporous adhesive, or heat and moisture exchanger (HME) helps reduce contact and contamination of the stoma. A multicenter study published in 2003 concluded that patients being compliant to HMEs reported a decrease in respiratory symptoms, including 68% less coughing, 73% less sputum, 60% less forced excretion, and 52% need for stoma cleaning.¹⁴ Some newer HMEs that filter bacteria, viruses, and small particles are recommended if affordable by patients.¹⁵ A summary of stoma hygiene is given in **Table 1**.

Voice Rehabilitation Devices

Apart from hand hygiene, it was crucial to ensure hygiene of the voice rehabilitation devices in preventing COVID-19 transmission, as most devices require frequent contact with the neck, stoma, and hand of the patient or carer. Each voice rehabilitation device also requires unique precautions, and a brief outline is given in **Table 2**.

Table 1. Routine and Specific Laryngectomy Stoma Care During COVID-19 in Prince of Wales Hospital and United Christian Hospital of Hong Kong.

Routine	Specific care during COVID-19
<ul style="list-style-type: none"> • Check for secretions at least 3 times a day. • Chest secretions should be coughed up and wiped away with disposable tissue. The use of a humidifier can help thin mucus secretions. • During cleaning of the stoma, a table mirror and good light source are required. • Use wet gauzes or disposable tissues to moisten and wipe away dried crusts. • Laryngectomy tubes, if worn, should be cleaned daily with soapy water under the tap with or without a brush. 	<ul style="list-style-type: none"> • Ensure compliance to wearing physical barriers, such as laryngectomy apron, stoma filter, or heat and moisture exchanger • Regular replacement or cleansing of physical barriers

Table 2. Routine and Specific Voice Prostheses Care During COVID-19 in Prince of Wales Hospital and United Christian Hospital of Hong Kong.

	Routine	Specific care during COVID-19
Electrolarynx	<ul style="list-style-type: none"> • Wiping with tissue paper or dry cloth after use 	<ul style="list-style-type: none"> • Wiping with alcohol swabs after use
Pneumatic device	<ul style="list-style-type: none"> • Insert rolled tissue strips into the tubing • Rinse the 2 tips with water daily and leave it to dry • Change tubings regularly 	<ul style="list-style-type: none"> • Soaking in 3% hydrogen peroxide solution for 5-10 min every time after use, followed by rinsing with boiled drinking water or normal saline.
TEP voice prosthesis: indwelling	<ul style="list-style-type: none"> • Brushing after meals with drinking water • Soak the brush in drinking water after use • <i>Nonindwelling</i>: Clean with brush or flushing device with drinking water 	<ul style="list-style-type: none"> • Brushing after meals • Soak the brush in disinfectants after use: 70% ethanol for 10 min, 70% isopropylalcohol for 10 min, 3% hydrogen peroxide for 60 min

Abbreviation: TEP, tracheoesophageal puncture.

Electrolarynx. The electrolarynx is placed over the neck or cheek for phonation. It should be wiped with alcohol swabs or wipes thoroughly after use to prevent contact contamination.

Pneumatic Device. The pneumatic device is soiled by saliva and sputum during phonation. Rolled tissue strips should be inserted into the tubing to keep it from moisture. It should be soaked in 3% hydrogen peroxide solution for 5 to 10 minutes every time after use, followed by rinsing with boiled drinking water or normal saline. Hydrogen peroxide works by producing destructive hydroxyl-free radicals that can attack membrane lipids, DNA, and other essential cell components and kill off bacteria, yeasts, fungi, viruses, and spores.¹⁶

Tracheoesophageal Puncture Voice Prostheses. Phonation with a tracheoesophageal puncture (TEP) voice prosthesis requires stoma occlusion with the patient's thumb, thus increasing the risk of contact and droplet contamination. TEP voice prostheses could be indwelling or nonindwelling and made with different materials. An in vitro study on biofilm growth was conducted on various choices of the modern TEP voice prostheses, which concluded that use of silver oxide coating and Teflon as valve flap materials showed significantly less surface biofilm formation.¹⁷ It might more effectively protect users against the current pandemic, since viral particles could penetrate the exopolymeric matrix of mucoid biofilms and thus benefit from a protective environment

against external aggressions.¹⁸ A dedicated brush should be used during cleansing of an indwelling device while facing a mirror to prevent colonization of pathogens with drinking water. This brush should be disinfected with one of the followings methods: 70% ethanol for 10 minutes, 70% isopropylalcohol for 10 minutes, or 3% hydrogen peroxide for 60 minutes.¹⁹ As for a nonindwelling device, it is removed and reinserted by the patient daily after being soaked in disinfectants. Brushing and flushing devices are readily available in commercial kits. However, cleansing of the TEP voice prosthesis could be challenging to patients and carers, where droplet and sputum contamination is common due to cough reflex. Hands-free HMEs are now available in the market, which significantly reduces the need of frequent hand-stoma contact during phonation.

Carers

Family and members providing laryngectomy care should remain vigilant during the battle of COVID-19. Carers should take universal precautions to put on gloves, surgical mask, and goggles during laryngectomy care, since procedures such as stoma suctioning could be aerosol generating.

Conclusion

Prevention against COVID-19 requires concerted effort. Contact precautions, droplet precautions with physical barriers, as well as hand and equipment hygiene should be carried out

with high vigilance. Currently, there is no literature regarding standard protocols on laryngectomy care. Nonetheless, no SARS-CoV-2-positive cases have been reported among patients with a laryngectomy in HK who are in compliance with the routines described in this article, and we hope that it remains the case. We will continue to adapt to any new condition or information regarding the virus in our medical centers to protect our staff, patients, and the families. May we all endure this.

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Author Contributions

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Availability of Data and Materials

Further clarification of discussed medical routines is available via email.

Supplemental Material

Additional supporting information is available in the online version of the article.

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