Challenges in Laryngology due to COVID-19

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We are all living in unprecedented times. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes the COVID-19 disease, has infected 15,450,417 patients worldwide, including 4,113,923 in the United States and 1,263,336 in India at the time of this writing this editorial. Deaths due to the virus are now up to 631,642, 146,378 and 30,122, respectively. Infections are on the rise in many countries. This virus poses unique challenges as its primary spread is now thought to

be via aerosols, often from presymptomatic people. Coronavirus spreads its infection at almost twice the rate of influenza viruses and is up to 20 times more deadly.¹ The hospitalization rates are also much higher, straining medical facilities worldwide.

As laryngologists, we face particular challenges as the upper airway has a high coronavirus burden in infected patients.² Routine procedures in all of our practices, including flexible laryngoscopy, laryngovideostroboscopy, and tracheotomy, all pose significant risk to us and our staff. While preliminary worldwide experience has informed our current approach, many of our practices are based on educated guesses instead of irrefutable evidence.

Early in the pandemic, tracheotomy was found to have a high risk of infecting the healthcare workers present. In response, much energy has gone into developing safe performance guidelines. Ultimately, the American Academy of Otolaryngology—Head and Neck Surgery, recommended tracheotomy to be performed 14–21 days after intubation, with most centers opting for 21 days.³ This recommendation was primarily based on the presumed viral load at the time of tracheotomy, as it has been shown that 21 days after symptoms emerge, the viral load is minimal.² Unfortunately, intubation for 21 days carries a grave risk of permanent injury to the trachea and larynx. We are already seeing patients in our outpatient clinics with significant laryngeal dysfunction following a prolonged intubation for COVID-19. Considering the reduction of viral load over time, one institution has been routinely performing tracheotomy at an average of 12 days after intubation, which is approximately 23 days after symptom onset. They have performed 78 tracheotomies without transference of infection, using N95 masks, eye protection, gowns, and gloves (unpublished data. Amin, M).⁴ Considering the timing of viral load from symptom onset as well as the risk of laryngeal injury due to prolonged intubation, it seems that the most prudent course is to perform tracheotomy at approximately 21 days from symptom onset, not from intubation as previously recommended.

When tracheotomy is performed, the ventilator should be paused to decrease aerosolization. Therefore, the patient is required

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to have already demonstrated adequate pulmonary reserve to tolerate several seconds of apnea following preoxygenation. The number of providers in the room should be minimized, and PPE should be used as described below. The first tracheotomy change should be delayed beyond the usual five days. Placement of a heat moisture exchanger (HME) with a viral filter is controversial as this may increase mucous plugging, and the patient should be COVID negative by the time they are a candidate for an HME.

Similar exposure risks must be considered for in-office aerosol-generating procedures (AGPs). As defined by the Centers for Disease Control and Prevention, AGPs are medical procedures that are more likely to generate higher concentrations of infectious respiratory aerosols than coughing, sneezing, talking, or breathing. While not comprehensive, such procedures include open suctioning of airways, sputum induction, cardiopulmonary resuscitation, endotracheal intubation, and bronchoscopy. AGPs result in a prolonged risk of exposure, as droplets can linger in a poorly ventilated room for more than three hours.⁵ Considering this, we must contemplate how we can safely see serial patients who require transnasal laryngoscopy or transoral laryngovideostroboscopy in an office setting. While aerosolization generally occurs from the patient coughing during the procedure, rather than the endoscopy itself, such reflexes are unpredictable. As such, all these procedures should be considered potential APGs. Physicians and ancillary staff should wear N95 masks, eye protection, gowns, and gloves during these procedures and follow strict hand hygiene guidelines. Powered atomizing topical anesthetic sprays should be avoided to minimize unnecessary aerosolization; soaked cotton pledgets may be used instead when necessary. All scoping is done transnasally. The patient wears a vented mask, or temporarily pulls the mask down to reveal the nose while still covering the mouth in case of coughing or gagging.⁶ The examination room is then thoroughly cleansed, with antiviral disinfectant applied to the examination table, chair, counter tops, and all surfaces and equipment with which the patient or provider came into contact. If there is severe

Table 1: Air changes per hour (ACH) and time required for airborne-contaminant removal⁷

ACH	Time (minutes) required for removal (99% efficiency)	Time (minutes) required for removal (99.996 efficiency)
2	138	207
4	69	104
6	46	69
8	35	52
10	28	41
12	23	35
15	18	28
20	14	21
50	6	8

coughing or gagging, then in addition to the same cleaning process, the room is closed for sufficient time to allow for clearance of 99% of the viral particles. This timing is based on the room air changes per hour (ACH)⁷ (Table 1). ACH can be calculated by the facility's engineering team based on the HVAC system and the size of the room. For example, if the examination room has 15 ACH, then the room should not be occupied again until 18 minutes after the AGP. For high-risk in-office surgery AGPs, such as a laryngeal biopsy or vocal fold injection, all patients are tested for coronavirus within 72 hours before the office visit. If a patient tests positive, the procedure is postponed. Even when negative, due to the risk of a falsenegative, these procedures are all still treated as AGPs and managed as described above.

Ideally, all patients should undergo a rapid test for SARS-CoV-2 on arrival to the physician's office, but such tests are not widely available or practical. As such, current guidelines in Columbia University Irving Medical Center require verbal screening for symptoms before the visit. On arrival, patients are again screened for symptoms, a temperature check is performed, and all patients are required to wear a mask prior to entering the office. Office visits are scheduled such that there will be minimal use of the waiting area to avoid patient crowding, which has been shown to increase

the levels of airborne virus and put uninfected patients and staff at risk. Ventilation in such areas is also integral to minimizing the airborne viral load.⁸

As we move forward, we will never be 100% safe until there is either natural herd immunity (which is unlikely) or a vaccine. We will slowly increase our practice volume to service as many patients as possible without having a crowded waiting area. This approach necessitates seeing fewer patients per hour than in the past. In response, we will be adding extra clinical hours to make up the difference. Most importantly, we must stay vigilant with the use of masks by all patients, and the use of the proper PPE and hand hygiene by physicians and staff. It is inevitable that we will encounter asymptomatic carriers in our offices. Therefore, we adhere to the recommendations above to minimize the risk of transmission to physicians, staff, and other patients.

REFERENCES

1. Fauci AS, Lane HC, Redfield RR. COVID-19—navigating the uncharted. *N Engl J Med* 2020;382(13):1268–1269. DOI: 10.1056/NEJMe2002387.
2. Zou L, Ruan F, Huang M, et al. SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *N Engl J Med* 2020;382(12):1177–1179. DOI: 10.1056/NEJMc2001737.
3. American Academy of Otolaryngology-Head and Neck Surgery Tracheotomy Recommendations During the COVID-19 Pandemic.
4. Amin M. Unpublished Data. New York, NY: New York University Langone Medical Center; 2020.
5. van Doremalen N, Bushmaker T, Morris DH, et al. Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N Engl J Med* 2020;382(16):1564–1567. DOI: 10.1056/NEJMc2004973.
6. Workman AD, Welling DB, Carter BS, et al. Endonasal instrumentation and aerosolization risk in the era of COVID-19: simulation, literature review, and proposed mitigation strategies. *Int Forum Allergy Rhinol* 2020;10(7):798–805. DOI: 10.1002/alr.22577.
7. Prevention, C.F.D.C.a., Guidelines for Environmental Infection Control in Health-Care Facilities.
8. Liu Y, Ning Z, Chen Y, et al. Aerodynamic analysis of SARS-CoV-2 in two Wuhan hospitals. *Nature* 2020;582(7813):557–560. DOI: 10.1038/s41586-020-2271-3.