This manuscript has been accepted for publication in Otolaryngology-Head and Neck Surgery.

Title: Flexible laryngoscopy and COVID-19

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Keywords: otolaryngology; COVID-19; laryngoscopy

Conflict of Interest: Dr. Anaïs Rameau is a co-founder of MyophonX, a wearable device used to restore speech in patients with limited phonation capacity. All other authors have no conflict of interest.

Authorship Contributions

Anaïs Rameau	Originated idea, co-wrote and edited manuscript.
VyVy N Young	Co-wrote and edited manuscript.
Milan R Amin	Co-wrote and edited manuscript.
Lucian Sulica	Originated idea, co-wrote and edited manuscript.

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Abstract

Flexible laryngoscopy is the gold standard evaluation of the larynx and the pharynx, and is one of the most commonly performed procedures in otolaryngology. During the COVID-19 pandemic, flexible laryngoscopy represents a risk for patients and an occupational hazard for otolaryngologists and any clinic staff involved with the procedure or endoscope reprocessing. Here we present a set of recommendations on flexible laryngoscopy performance during the pandemic, including patient selection, personal protective equipment and endoscope disinfection, based on a consensus reached during a virtual webinar on March 24, 2020, attended by approximately 300 participants from the American laryngology community.

On March 11, 2020, the World Health Organization declared Coronavirus Disease 2019 (COVID-19) a global pandemic, and by March 26, 2020, the United States became the country with the most known cases. COVID-19 currently reported case fatality rate is significantly higher than that of seasonal influenza.[1,2] This high mortality rate has not spared health care providers, and among those, otolaryngology has been one of the most affected specialties alongside anesthesia, critical care medicine, emergency medicine and ophthalmology.[3,4,5,6] The novel coronavirus is effectively threatening otolaryngologists, their patients and their practices.

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Increased risk of nosocomial infection in otolaryngology practices is likely due to the fact that the novel coronavirus is transmitted human-to-human via direct, fomite and droplet contact with respiratory tract droplets and secretions[7] – all high occupational risks in Otolaryngology. There is some evidence that transmission of the novel coronavirus may also occur via aerosolization, congruent with the Severe Acute Respitarory Syndrome (SARS) and the Middle Eastern Respiratory Syndrome Coronavirus (MERS-CoV) literature.[8,9] [10,11] All of the risks of coronavirus transmissions are present during the performance of flexible laryngoscopy. Transmission via aerosolization is of particular concern, given that viral loads are highest in the nose after onset of COVID-19 symptoms and patients may sneeze during endoscope manipulation.[12] Yet, flexible laryngoscopy is the gold standard evaluation of the larynx and the pharynx, and is one of the most commonly performed procedures in otolaryngology.[13] During the COVID-19 pandemic, this critical procedure represents a risk for patients and a high occupational hazard for otolaryngologists and any clinic staff involved with the procedure or the endoscope reprocessing.

Approximately 300 participants from the American laryngology community met via a virtual webinar on March 24, 2020 to discuss the impact of COVID-19 on Otolaryngology practice and to formulate consensus on office and operating room procedures.[14] Along with guidelines published in the pulmonary and gastroenterology literature, this webinar discussion informs the following recommendations to protect both patients and health care providers in consideration or performance of flexible laryngoscopy. Though guidelines for the performance of bronchoscopy and GI endoscopy in the setting of the SARS and COVID-19 pandemics have been published, no such guidelines exist for the performance of flexible laryngoscopy in the English language. [15,16,17,18,19] It should be noted that both the American Association for Bronchology and

Interventional Pulmonology and the American Society for Gastrointestinal Endoscopy recommend the performance of endoscopy for suspect cases in negative pressure rooms.[15,20] The following set of recommendations is limited by the current evidence, and will certainly evolve as new knowledge is generated.

1. Flexible laryngoscopy should only be performed in critical cases and when findings may have an immediate impact on patient management. Indications include hemoptysis, odynophagia limiting hydration and nutrition, or airway compromise - notably secondary to infectious and malignant conditions. Alternatives to laryngoscopy should be considered (e.g. CT scanning, ultrasound, etc.) for other cases such as work-up of head and neck mass, lymphadenopathy and mild airway stenosis.
2. Patients should be screened for fever and respiratory symptoms prior to flexible laryngoscopy and consideration should be given to testing for COVID-19 prior to the procedure, with the caveat that the current RT-PCR assay for COVID-19 has a significant false negative rate.[21] If possible, the exam should be delayed in infected or positively tested patients until appropriate quarantine has elapsed or the patient tests negative. In addition to a medical history for typical symptoms and a travel history, a fever measurement is also recommended. This should be performed prior to the entrance of the clinic practice.
3. In communities with high prevalence of COVID-19 infections, suspicion should be assumed even in asymptomatic patients and proper isolation precautions should be observed, including limiting the procedure room to essential personnel and performing the procedure in negative pressure room or designated isolation room.

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4. For patient with suspected or confirmed COVID infections, providers should wear powered, air-purifying respirator (PAPR) or N95 mask, in addition to standard personal protective equipment (PPE): eye protection, gown and gloves. Only the most experienced provider should be in the room, and observers should be excluded to reduce potential exposures and conserve PPE.[22] Patients should be provided with a surgical mask and gloves. For patients who are declared COVID-19 negative, N95 masks are still recommended in case of false negative viral testing.
5. Anesthetic gels are preferred over atomized or nebulized anesthetics, which may contribute to viral aerosolization.
6. Otolaryngologists should keep a distance from every patient during all steps taken before beginning laryngoscopy, and should practice hand hygiene before and after all patient interaction and contact with potentially infectious sources.
7. Laryngoscope disinfection is a prerequisite step for preventing any contagious disease to other patients, otolaryngologists and their assistants. Though there are no reported instances of bronchoscope virus transmission, there have been instances of hepatitis B and C transmission during colonoscopy.[23] Endoscope reprocessing is not standardized and varies widely, including automated reprocessing, gas sterilization with ethylene oxide, and chemical reprocessing with isopropyl alcohol, glutaraldehyde, chlorine dioxide or ortho-phthalaldehyde (OPA). To eliminate viral transmission, high level disinfection is recommended per local standards and can be achieved with all these methods except 70% isopropyl alcohol.[24] It is of utmost importance that the handle of the flexible laryngoscope gets reprocessed as well. Used laryngoscopes should be transported out of the exam room in closed containers to minimize the risk of direct or fomite

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transmission. Reprocessing staff must exercise hand hygiene before and after cleaning laryngoscopes.

8. Room sanitization must be practiced after flexible laryngoscopy on patients in confirmed or suspected infections, with thorough cleaning of all exposed surfaces using an Environment Protection Agency-registered disinfectant. Studies on the virucidal efficacy of chemical agents against SARS-CoV-2 are not available, and recommendations are based on studies done on other coronaviruses. The Joint Task Force of the Chinese Society of Anesthesiology recommends disinfection with 2 to 3% hydrogen peroxide, 2 to 5 g/l chlorine disinfectant, or 75% alcohol.[25]

Video or telephone consultations have gained traction to support our patients until we return to the quality and depth of traditional in-person assessment and treatment. Of course, this currently precludes laryngoscopic evaluation and limits the otolaryngologist's ability to narrow the differential diagnosis. It should however be sufficient as a screening tool for the identification of patients with critical needs, such as those with stridor. There is a risk of delayed diagnosis with not performing flexible laryngoscopy, but that risk is far outweighed by the risk of infectious spread of COVID-19. Flexible laryngoscopy in the age of COVID-19 requires adaptation. Until technological advances allow for alternatives to office-based laryngoscopy, our discipline will continue to require patient visits for complete evaluation, and it is thus imperative we maintain high standards for the prevention of nosocomial infections and further develop evidence for the safety of our interventions.

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