

Bronchoscopy, laryngoscopy, and esophagoscopy during the COVID-19 pandemic

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Abstract

Background: The United States now has the highest death toll due to COVID-19. Many otolaryngology procedures, including laryngoscopy, bronchoscopy, and esophagoscopy, place otolaryngologists at increased risk of coronavirus transmission due to close contact with respiratory droplets and aerosolization from the procedure. The aim of this study is to provide an overview of guidelines on how to perform these procedures during the coronavirus pandemic.

Methods: Literature review was performed. Articles citing laryngoscopy, bronchoscopy, esophagoscopy use with regard to COVID-19 were included.

Results: Laryngoscopy, bronchoscopy, and esophagoscopy are all used in both emergent and elective situations. Understanding the risk stratification of cases and the varied necessity of personal protective equipment is important in protecting patients and health care workers.

Conclusions: Summary guidelines based on the literature available at this time are presented in order to decrease transmission of the virus and protect those involved.

KEYWORDS

bronchoscopy, coronavirus, COVID-19, esophagoscopy, laryngoscopy

1 | INTRODUCTION

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus responsible for COVID-19 first appeared in Wuhan, China in December 2019. From there it has rapidly spread to become a global pandemic.¹ The United States now has the highest number of deaths due to COVID-19.² The virus is highly infectious with a median daily reproduction rate of 2.35 in Wuhan, China.³ The most common presenting symptoms of the coronavirus are fever, dry cough, and dyspnea.¹ Although 80% of cases are of asymptomatic to moderate severity, about 6% to 10% of cases progress to require the use of ventilatory support.^{1,4}

The virus has placed a significant burden on the health care system. Many hospitals are adapting to the new challenges they face in light of SARS-CoV-2. A myriad of organizations are creating new guidelines pertaining to COVID-19 to protect health care workers and decrease the spread of transmission. The virus is transmitted through fomite exposure, respiratory droplets, and aerosolization. Certain procedures, such as bronchoscopy, laryngoscopy, and esophagoscopy, result in close proximity with respiratory droplets and aerosol generation. Thus, the Centers for Disease Control and Prevention have deemed bronchoscopy a high-risk procedure.⁵

Bronchoscopy is used in a variety of diagnostic and therapeutic manners. Specifically in intensive care units, bronchoscopy is valuable in visualizing airways, sampling for diagnostic purposes, and managing artificial airways.⁶ In addition to bronchoscopy, laryngoscopy and esophagoscopy may also be used to visualize the airway and remove foreign bodies.^{7,8} Due to the high-risk nature of these procedures, organizations have issued new guidelines to establish safer practices.

The primary aim of this study is to perform a literature review and provide a summary of results of bronchoscopy, laryngoscopy, and endoscopy guidelines with respect to COVID-19. The second aim of this study is to provide guidelines with the expertise and experience of established otolaryngologists.

2 | METHODS

PubMed, Scopus, and Ovid were searched for English-language articles. The search terms “COVID,” “COVID-19,” “SARS-CoV-2,” “coronavirus,” “bronchoscopy,” “bronchoscope,” “esophagoscopy,” and “laryngoscopy” were used to construct the search function. Literature published by organizations online, which was not peer-reviewed, was also included in this study. The same search terms used in databases were used in the Google search engine. Guidelines relevant to bronchoscopy, laryngoscopy, and esophagoscopy in regard to COVID-19 were included. Unpublished documents from the author’s affiliated institutions were also reviewed.

3 | DISCUSSION

3.1 | Diagnosis of COVID-19

- Bronchoscopy should play a limited role.⁹⁻¹¹
- Tracheal aspirate or mini-bronchoalveolar lavage should be attempted before bronchoscopy is used.⁹
- Use only if upper respiratory samples are negative and findings would significantly change management.
- Example: immunocompromised patient where pneumocystis jirovecii infection must be ruled out.
- To obtain bronchoscopy sample for testing: 2 to 3 mL of specimen should be collected into a sterile, leak proof container.⁹⁻¹¹
 - Turning off suction after obtaining sample but before disconnecting sample from the device is advised.⁹⁻¹¹

3.2 | Risk stratification of bronchoscopy/laryngoscopy/esophagoscopy cases

- Commonly stratified into three categories: emergent, urgent, and nonurgent.^{10,11}
- Emergent cases: moderate-to-severe tracheal or bronchial stenosis, symptomatic central airway obstruction, massive hemoptysis, or migrated stent.
- Urgent cases: lung mass or mediastinal/hilar lymphadenopathy suspicious for cancer, foreign object aspiration, whole lung lavage, mild/moderate hemoptysis, and suspected infection in immunocompromised patients.
- Nonurgent: all other indications:
 - The American Association for Bronchology and Interventional Pulmonology has recommended that all nonurgent cases be postponed until May 2020, at the earliest.¹¹
- Emergent vs urgent cases operating room (OR) pathways (Figure 1).

3.3 | Use of bronchoscopy/esophagoscopy/laryngoscopy in high-risk COVID-19 patients

3.3.1 | Who?

- COVID-19 testing positive.
- COVID-19 testing pending, but urgent/emergent case.
- Has not been tested, but high-risk factors (symptomatic or contact with COVID-19 positive individuals).
- Emergent case with unknown COVID-19 status.

3.3.2 | Indications

- Removal of airway foreign body.
- Removal of esophageal foreign body.
- Microlaryngoscopy and bronchoscopy (MLB) for airway evaluation of respiratory failure or distress.
- MLB for airway dilation.

3.3.3 | General considerations

- Use proper hand hygiene.
- Use personal protective equipment (PPE)—gloves, powered air purifying respirator or N95 respirator mask, face shield, goggles, and fluid repellent gown.

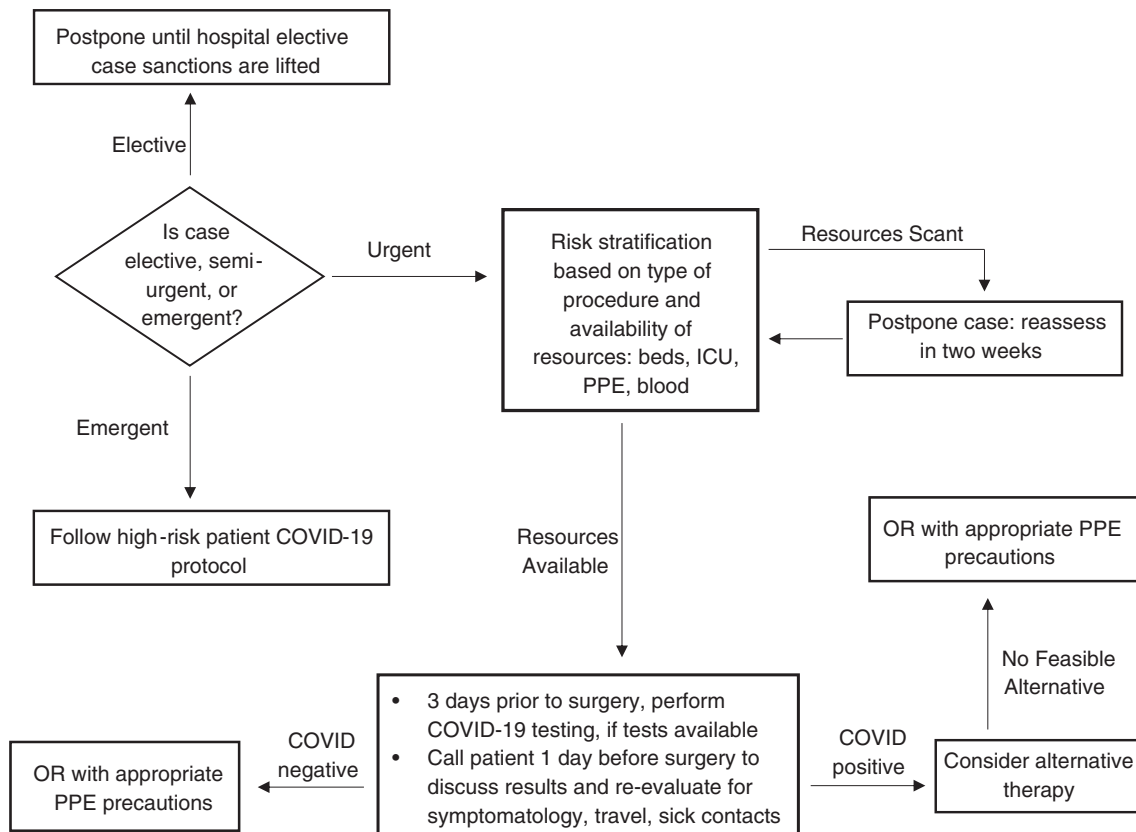


FIGURE 1 Pathway for operating room cases

TABLE 1 Personal protective equipment recommendations for procedure team members

	Anesthesia provider	Scrubbing/nursing/scrub PPE	Cleaning crew PPE
COVID+ patient for any procedure	<ul style="list-style-type: none"> Single-use N95 + face shield/goggles Hood Gown Double gloves Shoe covers 	<ul style="list-style-type: none"> Single-use N95 + face shield/goggles Gown Double gloves Shoe covers 	<ul style="list-style-type: none"> Surgical mask Face shield/goggles Gown Gloves
Asymptomatic patient for bronchoscopy, esophagoscopy, laryngoscopy	<ul style="list-style-type: none"> Single-use N95 + face shield/goggles Gown Double gloves 	<ul style="list-style-type: none"> Single-use N95 + face shield/goggles Gown Double gloves 	<ul style="list-style-type: none"> Surgical mask Face shield/goggles Gown Gloves
Asymptomatic with negative COVID-19 testing for any procedure	<ul style="list-style-type: none"> Standard PPE 	<ul style="list-style-type: none"> Standard PPE 	<ul style="list-style-type: none"> Standard PPE

Abbreviation: PPE, personal protective equipment.

- Use extra caution when doffing to prevent contamination.
- Use negative pressure room (may not be possible with emergent case).
- Ensure oxygen level at safe level (<30%) to prevent fire.
- Only essential personnel in the room.
- The PPE of each member of the procedural team is detailed in Table 1.

3.3.4 | Surgical site tent

- If possible, create surgical tent.
- Purpose: will trap particles from being released into the OR environment which is a concern due to aerosolization during otolaryngology procedures.
- Equipment for tent: clear plastic drapes: O-ARM and C-ARM drapes, smoke evacuator tubing, laryngoscopy

suspension arm or ether screen armature, regular procedure equipment.

3.4 | Use of bronchoscopy/esophagoscopy/laryngoscopy in low-risk COVID-19 patients

- Follow OR pathway guidelines in Figure 1.
- If patient tests *COVID negative* in last 24 to 48 hours.
 - Personnel only need standard PPE (Table 1).
 - If newly symptomatic, discuss retesting and using more robust PPE.
- If patient is *asymptomatic with no recent travel or sick contacts*:
 - 3 days prior to surgery, call patient in to test them.
 - Ask patients to maintain quarantine until surgery.
 - Call patients 1 day before surgery and inform them of results and inquire about new onset symptoms, fevers, travel, or contact with COVID-19 infected persons.¹²
 - If testing is not available, call 1 day before surgery and ascertain if patient is symptomatic or has had any recent travel/exposure to sick contacts.
 - If symptomatic or recent travel or sick contacts, this patient is now high risk.
 - In places with high COVID-19 prevalence, due to the possibility of occult infections, full PPE should still be worn during bronchoscopies if negative.¹¹
 - Detailed use of PPE is detailed in Table 1.


3.5 | General recommendations

- Using bronchoscopy/laryngoscopy/esophagoscopy for COVID-19 testing should be last resort.
- Always use proper hand hygiene.
- Categorize patients based on risk stratification and proceed accordingly.
- Use proper PPE based on patient COVID-19 and risk factors as detailed in Table 1.
- Use surgical site tenting when appropriate.

CONFLICT OF INTEREST

The authors declare no potential conflict of interest.

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