

Gone with the wind! Changes in the practice of bronchoscopy post pandemic: A perspective

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“On March 30th of this year, I had the honor to assist my admired principal, Prof. Killian, in the extraction of a piece of bone from the right bronchus. This case is of such peculiarity with respect to its diagnostic and therapeutic importance that a more extensive description seems justified.”

O. Kollofrath on the bronchoscopy conducted by Prof. Gustav Killian in 1897.^[1]

From the first bronchoscopy in 1897, interventional pulmonologists (IP) have developed innovative technologies to improve diagnostic and therapeutic outcomes, revolutionizing the field of thoracic medicine.^[2] Techniques and procedural preparation have also evolved to improve safety and minimize the risk of disease transmission. While the practice of interventional pulmonology continues to advance, the current COVID-19 pandemic demands a conscientious, differential approach to any invasive or aerosol-generating procedure. Studies have demonstrated that currently 6% of the total health-care workforce has been infected by COVID-19.^[3] Emerging evidence suggests an airborne mode of transmission for COVID-19, making the performance of bronchoscopy a high-risk procedure.^[4] In addition, the transmission of multidrug-resistant microorganisms via bronchoscopy has necessitated the re-defining of instrument decontamination,

strict infection control policies, and prudent use of this revolutionary tool.^[5] These critical challenges evoke core questions regarding the future of interventional pulmonology and the long-lasting impact the pandemic may have on the practice of bronchoscopy.

Expert Statements by International Societies

International societies such as the American College of Chest Physicians (ACCP) and the American Association of Bronchology and Interventional Pulmonology have published expert panel reports to guide the practice of bronchoscopy during the COVID-19 pandemic.^[6] Appropriate personal protective equipment, preprocedural screening for COVID-19, and adapting methodologies to minimize infection transmission have been universal themes. The indications for bronchoscopy have also been modified, based on the urgency of the procedure, as highlighted by Wahidi *et al.* in ACCP guidelines.^[6] Another challenge is the timing of bronchoscopy for patients who have recovered from COVID-19 as the duration of infectivity of severe acute respiratory syndrome-CoV-2 has been suggested to be highly variable, lasting up to 37 days.^[7] While emergent and urgent procedures are being performed with the best precautionary measures, agreement is lacking regarding the length of postponement of nonurgent procedures. The pandemic is transforming interventional pulmonology and its future.

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“Primum Non Nocere” – First, do no Harm

This quotation applies not only to our patients but also to our colleagues and ourselves when performing an aerosol-generating procedure. In cases of nonurgent bronchoscopic procedures, thorough consideration of the utility of the procedure and effective alternatives is required. A cautious approach can be applied if bronchoscopy is deemed necessary. Soon after referral to the interventional pulmonology service, patients can be requested to self-isolate to prevent any high-risk exposure. Reverse transcription–polymerase chain reaction testing, followed by computed tomography of the chest, can be used to detect asymptomatic carriers.^[8] On the day of the procedure, point-of-care testing can be repeated, followed by a symptom questionnaire and temperature monitoring. Bronchoscopy can then be performed in a negative pressure bronchoscopy suite with a minimum number of personnel in full personal protective gear.

Are there any Permanent Changes?

“Things change and work changes. Right now, I like the idea of enveloping a space and getting messages across that connect to the world in ways that seem familiar but are different.”

Barbara Kruger

Several cities across the world have experienced widespread community transmission of COVID-19, with a large number of asymptomatic carriers.^[9] The impacts of this pandemic on the practice of interventional pulmonology will be significant and permanent [Figure 1]. Improvisation is needed to continue to deliver world-class care to our patients who need bronchoscopy. The bronchoscopy suite will require restructuring into a negative pressure room with a separate postanesthesia care unit (PACU). Sharing a PACU with other subspecialties may expose patients and health-care team members to unnecessary risk of infection. Only essential health-care personnel should be present in the room, with the most experienced proceduralist performing the bronchoscopy. Rapid on-site cytologic evaluation has become indispensable to improve diagnostic yield and minimize the need for future bronchoscopy.^[10] A separate space outside the bronchoscopy suite may need to be established for the cytopathologist to function in a safe environment.

A pragmatic approach which provides the least risk of aerosolization is performing bronchoscopy with the patient under general anesthesia, thus blunting the cough reflex. The use of a laryngeal mask or endotracheal intubation with an 8.5 mm endotracheal tube may be required for procedures such as endobronchial

ultrasound (EBUS) and advanced bronchoscopy. Alternatively, the transnasal approach may be used to minimize the gag reflex and aerosol dispersion.^[11] A brief pause in mechanical ventilation may be needed for quick airway examination. EBUS-guided biopsies may have to be preplanned for efficiency and promptness. Station four and station seven lymph nodes can be quickly identified and targeted for sampling.^[12] Due to the risk of balloon detachment, the balloon is not applied over the EBUS scope transducer. Centers across the world have used novel techniques, such as an isolation box, a slotted mask, and positioning away from the airway to minimize the risk of exposure to the proceduralist [Figure 2]. For bronchoalveolar lavage (BAL), less saline should be used to minimize the risk of aerosol generation. A thorough decontamination process with high-level disinfectant and frequent quality checks to prevent transmission of infection via the instrument should be conducted.^[13] Single-use bronchoscopes can be used for simple procedures, such as airway examination and BAL, as they are more cost-effective and reduce the risk of cross-contamination compared to conventional re-usable bronchoscopes.^[14] While electromagnetic navigational bronchoscopy has revolutionized the evaluation of small peripheral nodules, percutaneous needle aspiration and biopsy may have to be used temporarily, given the shorter procedure time and established accuracy.^[15] Robotic-assisted bronchoscopy has proven safe and feasible for sampling peripheral lung nodules, and the pandemic may provide a further opportunity to debut



Figure 1: Changes in attire due to COVID-19 pandemic



Figure 2: An innovative approach to performing bronchoscopy using a protective box during COVID-19 pandemic

this novel addition to the advanced bronchoscopy armamentarium.^[16]

Importantly, the need for bronchoscopy in the management of certain disease processes will need to be revisited. American Thoracic Society guidelines for the management of sarcoidosis assert that for asymptomatic stage I sarcoidosis with classical clinical syndromes (Löfgren's syndrome or Heerfordt's syndrome), bronchoscopic lymph node sampling is not required.^[17-19] Atelectasis in critically ill patients should be managed noninvasively with chest percussion therapy, vibration and kinetic therapy, and manual air inflation. Bronchoscopy should be reserved for impacted secretions leading to severe hypoxemia.^[20] The role of surveillance bronchoscopy in lung transplant recipients (LTR) may also need to be re-defined based on the clinical characteristics of the patient. Bronchoscopy may be reserved for LTR patients during the early transplant course or those with clinical decline.^[21]

The Impact on Trainees and Future Pulmonologists

"The practice of medicine is an art, not a trade; a calling in which your heart will be exercised equally with your head."

William Osler

The COVID-19 pandemic is adversely impacting trainees, fellows, and future IP. Due to the significant decrease in procedure volume, limited personnel in the operating room, and the most experienced bronchoscopist performing the procedure, the trainees are receiving inadequate experience and training. In addition, strained health-care resources and significant patient volume necessitate their recruitment for the care of admitted COVID-19 patients.

Although simulation and virtual exercises can never replace clinical experience and patient interaction, the use of modern technology such as Microsoft HoloLens®, augmented reality, and simulation-based training may facilitate the achievement of competency in technique and build muscle memory for the trainees. As mentors and educators, we must develop a curriculum to provide real-world experience to our future pulmonologists.

Conclusion

With the uncertainty of the future and the experience of the past, now is the time to reflect, consider, and improvise approaches to provide the best care to our patients. Meticulous patient selection, preprocedure screening, and appropriate personal protective equipment will become standards of practice. Guidelines by international societies which delineate the need for the procedure based on urgency can minimize risk and improve outcomes. A thorough assessment of patients needing nonurgent procedures should be conducted. Bronchoscopy suites may need to have negative pressure capabilities and isolated postprocedural care units. Our continued focus must encompass training future pulmonologists, research, novel techniques, and simulation.

The COVID-19 pandemic has given us a unique opportunity to improve the practice of interventional pulmonology and create a brighter future for all.

Nothing is lost, nothing is created, everything is transformed.

Antoine Lavoisier

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Conflicts of interest

There are no conflicts of interest.

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