Review Article

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Bronchoscopy and respiratory specimen collection for COVID-19

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Abstract:

The COVID-19 pandemic is the first and most challenging health condition in the 21st century. The number of patients confirmed with COVID-19 disease worldwide is now above one million, and the number of deaths is increasing day by day. Bronchoscopy is a procedure used for the diagnosis and treatment of various conditions, but it can also transmit disease if appropriate precautions are not followed. In this short review, the limited scientific knowledge about bronchoscopy in COVID-19 pneumonia and the precautions which should be performed are summarized.

Keywords:

Bronchoscopy, COVID-19, endobronchial ultrasonography

Introduction

Since December 2019, the world has been struggling seriously with severe acute respiratory syndrome- coronavirus-2 (SARS-CoV-2). It is a new coronavirus of reported from pneumonia cases in Wuhan firstly.[1] The World Health Organization (WHO) declared the outbreak to be a Public Health Emergency of International Concern on January 30, 2020, and recognized it as a pandemic on March 11, 2020.[2] We now know that SARS-CoV-2 spreads fastly and can be fatal for especially old people with comorbidities. According to WHO reports, the number of patients confirmed with COVID-19 disease worldwide is now above one million, and the number of deaths is increasing day by day.[3]

Although the endemic HCoVs have been identified from a variety of upper and lower respiratory sources including oropharyngeal (OP)/nasopharyngeal (NP) swabs, sputum, and bronchial fluid, the US Centers for Disease Control and Prevention (CDC) recommends collecting especially the upper respiratory NP swab. However, collection of an OP specimen is a lower priority but if collected, should be combined in the same tube as the NP swab.[4] On the other hand, induction of sputum collection is not recommended.[5] For the most sensitive detection of SARS-CoV-2 as SARS-CoV, MERS-CoV, the collection and testing of both upper and lower respiratory samples (sputum, bronchoalveolar lavage fluid) is recommended.[6]

Bronchoscopy is a procedure used for the diagnosis and treatment of various conditions, but it can also transmit disease if appropriate precautions are not followed. Because as we know the spread of SARS-CoV-2 occurs among humans via direct contact or through air-droplet and the higher risk of transmission is within approximately 1 m from the infected person, the maximum distance is still undetermined.[7] In addition, several studies have reported nosocomial outbreaks and pseudo-outbreaks which are caused by various bacteria or viruses linked to

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inadequately processed bronchoscopes.[8,9] In this context, bronchoscopy has a higher risk in the cases of SARS-CoV-2 for both patients and health-care providers. Is it sufficient to screen based on symptoms? This is not sensitive; if a routine bronchoscopy patient (e.g., for a lung nodule) is infected but asymptomatic and therefore remains undetected, then health-care providers will be unprotected.

In What Situations, When and to Whom Should We Perform Bronchoscopy?

As it is not very common in our country yet, there is no suggestion for this question in the recently published national guideline. However, the American Association for Bronchology and Interventional Pulmonology has provided an initial statement on the use of bronchoscopy and respiratory specimen collection in patients with suspected or confirmed COVID-19 infection.[10]

General Recommendations for Collection of Respiratory Specimen Collection for Suspected COVID-19

- Collection of specimens to test for SARS-CoV-2 from the upper respiratory tract (NP and OP swab) is the preferred method for diagnosis
- Respiratory specimen collection is recommended in suspected COVID-19 regardless of time of onset of symptoms
- Induction of sputum collection is not recommended
- Tracheal aspirates and nonbronchoscopic alveolar lavage may be used in the intubated patient for an alternative respiratory specimen collection
- If bronchoscopy is being performed for COVID-19 sample collection, a minimum of 2–3 ml of specimen into a sterile, leak proof container for specimen collection is recommended
- All respiratory specimen collection procedures should be done in negative-pressure rooms (if available)
- Only essential personnel should be present when performing any specimen collection
- Laboratory should be alerted for regarding COVID-19 specimen processing and testing.

General Personnel Preparation if Bronchoscopy is Needed in Patients with Suspected or Confirmed COVID-19 Infection[10]

- Patient should be placed in airborne infection isolation room (AIIR)-negative pressure room
- All personnel should wear personal protective equipment (PPE) (a powered, air-purifying respirator or N95 mask and eye protection, gown, gloves, respiratory protection)
- Follow CDC instructions for proper donning and doffing of all protective equipment and disposable devices
- Disposable bronchoscopes should be used first line if available
- Follow standard disinfection protocol of durable re-usable video monitors and high-level disinfection for re-usable bronchoscopes
- Procedure and specimen collection should be done by minimal essential medical personnel.

General Precautions for Performing Nonurgent Bronchoscopy among Patients without Suspected COVID-19 Infection[10]

- The recent suspicious contact with infected people should be asked to all patients and/or their close contact people before entering the bronchoscopy suite. Bronchoscopy should be postponed if the patient has this history
- All patients should be asked about any symptoms (fever or ongoing infectious or respiratory symptom) prior to bronchoscopy. Procedures should be postponed if possible until such symptoms have resolved or testing (if available) is negative. If procedures cannot be postponed, the procedure should be performed according to precautions for bronchoscopy in suspected COVID-19 infection
- In communities with a high prevalence of COVID-19 infections, even for routine bronchoscopies also, asymptomatic patient proper isolation precautions should be adhered with such as limited the number of personnel and negative-pressure room or designated isolation room (AIIR)
- Today, bronchoscopists in our country should wear all PPE for all bronchoscopy procedures in their institutions because the COVID-19 infection has spread to all region. Hence, to avoid the unnecessary use and potential exhaustion of N95 resources, the bronchoscopy indications must be chosen carefully
- Asymptomatic patients may present from the community without any COVID-19 contact history, but may harbor an occult COVID-19 infection. Such concerns are primarily valid in communities with a high prevalence of COVID-19 infection and where community transmission has occurred. In our country, the health-care team should perform all bronchoscopies by wearing appropriate PPE for such patients.

Indications for Bronchoscopy in Patients with Suspected or Confirmed COVID-19 Infections[10]

- Bronchoscopy is relatively contraindicated in patients

with suspected and confirmed COVID-19 infections. However, it may be performed when less invasive testing to confirm COVID-19 are insufficient, or suspicion for an alternative diagnosis that would impact clinical management
- Bronchoscopy for any nonurgent reason should be postponed until after full recovery and the patient is declared free of infection
- If immediate testing is not available, bronchoscopy should be deferred if possible
- Bronchoscopy (flexible and rigid) for urgent/emergent reasons should be considered only if a lifesaving bronchoscopic intervention (emergent bronchoscopy).

Suggestions for Indications of Bronchoscopy[10]

Emergent bronchoscopy
- Severe or moderate symptomatic tracheal or bronchial stenosis
- Symptomatic central airway obstruction (endotracheal or endobronchial mass or mucus plug)
- Massive hemoptysis
- Migrated stent.

Urgent bronchoscopy
- Lung mass suspicious for cancer
- Mediastinal or hilar adenopathy suspicious for cancer
- Whole lung lavage
- Foreign object aspiration
- Mild to moderate hemoptysis
- Suspected pulmonary infection ini mmunocompromised patients.

Non-urgent bronchoscopy (to be postponed)
- Mild tracheal or bronchial stenosis
- Clearance of mucus
- High suspicion of sarcoidosis with no immediate need to start therapy
- Chronic interstitial lung disease
- Detection of chronic infection (MAI)
- Chronic cough
- Tracheobronchomalacia evaluation
- Bronchial thermoplasty
- Bronchoscopic lung volume reduction.

Furthermore, a different perspective is that Ost DE suggests to decrease this risk by testing all patients prior to undergoing any type of bronchoscopy and/or increase the level of healthcare provider protection in the bronchoscopy area.[11] However, in today's condition, when this test becomes more common, it can be applied once all other high-priority patients can be tested. Another suggestion is to consider delaying elective cases when possible. It has been reported that a brief delay (2–3 weeks) will not have an adverse impact on cancer diagnosis and staging.[12]

In addition, there are other International Societal Guidelines/Recommendations on bronchoscopy in COVID-19 pandemia have been reported, and Henri Colt summarized these guidelines recommendations [Table 1].[13]

Endobronchial ultrasonography
- There are no data or recommendations regarding EBUS yet
- Hence, we should act according to bronchoscopy recommendations
- Endobronchial ultrasonography guided transbronchial needle aspiration should be done patients only for staging any malignancies
- EBUS indications other than diagnosis or staging of malignancy should be postponed.

Conclusion

We highlighted some major points of bronchoscopic procedure in the time of COVID-19 infection, as a conclusion.
- High risk of transmission of infection to providers via bronchoscopy
- Bronchoscopy should be postponed excluding emergent and urgent indications
- All patients should be asked about any fever or ongoing infectious or respiratory symptoms prior to bronchoscopy; make your decision according to the answers
- Consideration for use of a disposable bronchoscope if available
- Flexible better than rigid bronchoscopy in a negative pressure room if available and transnasal passage should be preferred
- Minimize staff in room during procedure
- All PPE should be used: Face shield/goggles, cap, N95 mask, Contact isolation gown, Gloves
- Avoid jet ventilation
- Standard disinfection protocols should be followed for cleaning your flexible bronchoscopes and video monitors
- In case of negative-pressure rooms, a delay of about 30 min is suggested before allowing a new patient to enter in the room
- In the absence of negative-pressure rooms, alternative measures such as diluting the air in a space with cleaner air from outdoors should be considered and the room kept empty for at least 1 h.

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Table 1: Bronchoscopy during COVID-19 Pandemic: Summary of International Societal Guidelines/ Recommendations[10,12-15]

	Non-COVID-19 patient	COVID-19 patient (known or suspected)
Procedure		
Ideal setting	Negative-pressure room	Negative-pressure room
Staff	Limit personnel	Essential personnel only
Patient mask	Slotted mask if transnasal or transoral approach without advanced airway	Yes (if not intubated)
PPE		
Mask	N95 or FFP3 if significant community prevalence Consider daily re-used N95 or FFP3 if low supply	PAPR (superior protection), N95, or FFP3
Eyes	Eye protection; full face shield if re-using N95/FFP3	Full face shield
Other	Gown, gloves, cap	Gown, gloves, cap
Anesthesia	Avoid atomized or nebulized lidocaine sedation to minimize cough Consider paralysis to minimize coughing general anesthesia	Avoid atomized or nebulized lidocaine sedation to minimize cough Consider paralysis to minimize coughing general anesthesia
Equipment	No consensus/recommendations	Disposable if available
Approach	Avoid rigid bronchoscopy if possible	Avoid rigid; minimize flexible cope in/out
Ventilation	Close-circuit ventilation if advanced airway; avoid jet	Closed-circuit ventilation if advanced airway; avoid jet
Postprocedure		
Scope disinfection	No consensus/recommendations	Standard high level
Room disinfection	No consensus/recommendations	Consider air circulation time per local air controls Consider sterilizing surfaces

PPE: Personal protective equipment, PAPR: Powered, air-purifying respirator

Conflicts of interest

There are no conflicts of interest.

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