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COMMENTARY

Summarizing societal guidelines regarding bronchoscopy during the COVID-19 pandemic

Key words: bronchoscopy, COVID-19, infection control.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus responsible for pandemic coronavirus disease 2019 (COVID-19), is predominantly transmitted via large droplets and fomites. However, healthcare workers (HCW) participating in aerosol-generating procedures such as bronchoscopy, endotracheal intubation, upper gastrointestinal endoscopy, otolaryngological procedures involving the upper airway and tracheotomy are also at risk for aerosol-transmitted infection. Given the well-documented asymptomatic SARS-CoV-2 infection with viral shedding, infectious aerosol might also be generated from asymptomatic patients as community prevalence rises.

Several bronchology societies have issued guidelines regarding bronchoscopy during the COVID-19 pandemic.¹⁻⁵ However, none are comprehensive and significant uncertainty remains regarding in whom to perform bronchoscopy and how to perform it safely in this rapidly changing clinical environment. No data specific to bronchoscopy in COVID-19 are yet available, so most recommendations are expert opinion derived from observations made during prior respiratory viral outbreaks including SARS, Middle East respiratory syndrome (MERS) and influenza.

Tables 1 and 2 summarize existing guidelines regarding bronchoscopy in patients not suspected of harbouring SARS-CoV-2 and in those known or suspected to be suffering from COVID-19, respectively. All societies reviewed recommend postponing elective procedures and limiting

Table 1 Bronchoscopy in patients *without* known or suspected COVID-19

Organization	CMA	AABIP	DGP	SEPAR	AABE
Triage					
Acuity	Postpone elective	Postpone elective [†]	Postpone elective	Postpone elective	Postpone elective
Screening	Temperature, symptoms	Travel, symptoms	—	Temperature, symptoms, contacts	Symptoms, travel, sick contacts
Procedure					
Ideal setting	—	Negative pressure room [‡]	—	Negative pressure room	—
Staff	Limit personnel	Limit personnel	Limit personnel	Limit personnel	—
Mask for patient	Yes	—	Yes	—	—
PPE					
Mask	Surgical; N95 if sick contact	N95 [‡]	Re-used N95 [§]	FFP2 or FFP3 depending on risk (e.g. sick contacts)	—
Eyes	Glasses or eye mask	Face shield	Eye protection	Eye protection	—
Other	Gown, gloves, cap	Gown, gloves	Gown, gloves	Gown, gloves	—
Anaesthesia	No atomized lidocaine	—	—	—	—
Approach	—	—	Flexible better than rigid	—	—
Ventilation	—	—	Avoid jet ventilation	—	—

[†]Specific indications considered elective by AABIP: mild airway stenosis, mucus clearance, suspect sarcoidosis but no indication for treatment, chronic ILD, suspect MAI, chronic cough, tracheobronchomalacia evaluation, bronchial thermoplasty and bronchoscopic lung volume reduction.

[‡]If community prevalence is high.

[§]If community prevalence is high and supplies are low.

AABE, Argentinean Association for Bronchology; AABIP, American Association for Bronchology and Interventional Pulmonology; CMA, Respiratory Branch, Chinese Medical Association; COVID-19, coronavirus disease 2019; DGP, German Respiratory Society; ILD, interstitial lung disease; MAI, *Mycobacterium avium*-intracellulare; PPE, personal protective equipment; SEPAR, Spanish Society of Pneumology and Thoracic Surgery.

Table 2 Bronchoscopy in patients *with* known or suspected COVID-19

Organization	CMA	AABIP	DGP	SEPAR	AABE
Triage					
Indications	Not specified	See footnote [†]	See footnote [†]	See footnote [†]	See footnote [†]
Procedure					
Ideal setting	Negative pressure room	Negative pressure room	—	Negative pressure room	Negative pressure room
Staff	Limit personnel	Essential personnel only	Limit personnel	Minimum necessary	Essential personnel only
Mask for patient (if not intubated)	Yes	—	Yes (slotted to allow transnasal access)	Yes. Consider suction catheter in mouth	—
PPE					
Mask	PAPR or N95	PAPR or N95	FFP3	FFP3	N95
Eyes	Eye protection	Face shield	Safety glasses	Full face mask	Eye protection
Other	Gown, gloves, cap	Gown, gloves		Gown, gloves	Gown, gloves, cap, shoe cover
Anaesthesia	No atomized lidocaine	—	—	Sedation: reduce cough	—
Equipment	Disposable if available	Disposable if available		Disposable if available	Disposable if available
Approach	Avoid rigid bronchoscopy [‡] . Advanced airway. Minimize scope in/out	—	Avoid rigid bronchoscopy [‡] . Transnasal preferred	Transnasal preferred	—
Ventilation	Avoid jet; closed circuit	—	Avoid jet; closed circuit	—	—
Post-procedure					
Scope disinfection	Standard high level	Standard high level	Standard high level	Standard high level	Standard high level
Room disinfection	>30 m Air purification time, terminal clean	Standard disinfection of monitors	—	Sterilize surfaces in contact with patient or secretions	—

All guidelines suggest bronchoscopy is relatively contraindicated in COVID-19 or should play a limited role in diagnosis and management.

[†]Possible indications: inconclusive non-invasive COVID-19 testing²⁻⁵; concern for an alternate aetiology of respiratory disease which would change management²⁻⁵ (especially in immunocompromised⁴); suspicion of superinfection^{4,5}; and lobar or entire lung atelectasis concerning for mucus plugging,⁴ facilitate tracheostomy,⁴ life-saving or emergent intervention (significant haemoptysis, severe central airway obstruction or stenosis, foreign body).²⁻⁵

[‡]Unless unavoidable in the clinical circumstance.

AABE, Argentinean Association for Bronchology; AABIP, American Association for Bronchology and Interventional Pulmonology; CMA, Respiratory Branch, Chinese Medical Association; COVID-19, coronavirus disease 2019; DGP, German Respiratory Society; PAPR, powered air-purifying respirator; PPE, personal protective equipment; SEPAR, Spanish Society of Pneumology and Thoracic Surgery.

the number of staff participating in any procedure to minimize the use of personal protective equipment (PPE) and reduce known or occult exposure to infectious aerosol. All considered known or suspected COVID-19 to be a relative contraindication to bronchoscopy, given the uncertainty of its benefit and clear risks to participating staff. Table 3 represents a consolidation of existing guidelines regarding bronchoscopy in patients with and without COVID-19.

In procedures which cannot be deferred, infection of HCW may occur from any of the three transmission modes discussed above. Protective measures against infectious aerosols include use of respirator-level respiratory protection, negative pressure rooms where

feasible and avoidance of devices that purposefully produce aerosols including nebulizers or atomizers which can be contaminated with virus after a cough or sneeze with subsequent aerosolization. Recommendations to avoid open tube rigid bronchoscopy, jet ventilation and interruption of an otherwise closed ventilation circuit by repeatedly removing and re-introducing the bronchoscope are intended to reduce high-flow and high-shear conditions which generate aerosol droplets.

Measures protecting against droplet transmission include covering the patient's nose and mouth with a simple medical mask (which can be slotted to permit transmask, transnasal or transoral flexible

Table 3 Summary considerations

	Non-COVID patient	COVID patient (known or suspected)
Triage		
Acuity or indications	Postpone elective [†]	See footnote [‡]
Screening	Symptoms [§] , sick contacts [§] , pre-procedure vitals	Not applicable
Procedure		
Ideal setting	Negative pressure room	Negative pressure room
Staff	Limit personnel	Essential personnel only
Mask for patient	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
Anaesthesia	Avoid atomized or nebulized lidocaine Sedation to minimize cough Consider paralysis to minimize cough in general anaesthesia	Avoid atomized or nebulized lidocaine Sedation to minimize cough Consider paralysis to minimize cough in general anaesthesia
Equipment	No consensus/recommendations	Disposable if available
Approach	Avoid rigid bronchoscopy [¶]	Avoid rigid bronchoscopy [¶] ; minimize flexible scope in/out
Ventilation	Closed-circuit ventilation if advanced airway; avoid jet	Closed-circuit ventilation if advanced airway; avoid jet
Post-procedure		
Scope disinfection	No consensus/recommendations	Standard high level
Room disinfection	No consensus/recommendations	Consider air circulation time per local air controls Consider sterilizing surfaces

[†]Specific indications considered elective by AABIP: mild airway stenosis, mucus clearance, suspected sarcoidosis without indication for immediate treatment, chronic interstitial lung disease, suspected *Mycobacterium avium*-intracellulare, chronic cough, tracheobronchomalacia evaluation, bronchial thermoplasty and bronchoscopic lung volume reduction.

[‡]Possible indications: inconclusive non-invasive COVID-19 testing²⁻⁵; concern for an alternate aetiology of respiratory disease which would change management²⁻⁵ (especially in immunocompromised⁴); suspicion of superinfection^{4,5}; lobar or entire lung atelectasis concerning for mucus plugging,⁴ facilitate tracheostomy,⁴ life-saving or emergent intervention (significant haemoptysis, severe central airway obstruction or stenosis, foreign body).²⁻⁵

[§]Consider phone screening 1–2 days in advance.

[¶]Unless unavoidable in the clinical circumstance.

AABIP, American Association for Bronchology and Interventional Pulmonology; COVID-19, coronavirus disease 2019; PAPR, powered air-purifying respirator; PPE, personal protective equipment.

bronchoscopy), minimizing cough pharmacologically, and a full complement of barrier PPE (gown, gloves, cap and wrap-around eye protection). Fomite transmission may be reduced by using disposable bronchoscopes in known COVID-19 patients, sterilizing surfaces which might have been contaminated by respiratory secretions or droplets, proper removal of PPE and meticulous hand hygiene. There appears to be a particular dearth of information regarding optimal post-procedure decontamination procedures.

Data specific to bronchoscopy in the COVID-19 era are urgently needed. National and international bronchology societies should work together to rapidly develop pertinent research endeavours and strive to provide their members with the most comprehensive and up-to-date recommendations possible. More than a few lives depend on them.

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