Supplementary Table 1. Reported indications, utility, bronchoscopic finding and complications

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| Author | Number of patients | Number of bronchoscopies | Number of BAL | Agemean±SD ageormedian (IQR ) | Gender | Comorbidities | Indication-number of procedure (if available) | Bronchoscopic findings | Secondary or previously unidentified infection | Change in management | Complications |
| Guarino et al.17 | 87 | 87 | NS | NS | NS | NS | Increased resistance-30Suspicion for DAH-17Repositioning of ET-9Assistance with tracheostomy-10Difficult intubation-3Suspected aspiration pneumonia-2Suspected tracheal injury-1Suspected obstruction by mucus or clot-7 (was on NIV)Detection of COVID-19 in BAL-8 | Atrophic mucosa with fluid secretionHyperemic mucosa with superficializationof the submucosal vessels and telangiectatic tractsSpontaneously bleeding in some casesAlveolar hemorrhage | Legionella-2Fungal-2 | BAL identified COVID-19 in 4/8 patients13/17 patients had DAH who were receivingAnti-thrombotic therapy and anti-coagulant therapy  | In 5/7 patients on NIV bronchoscopy had to be stoppedDesaturation below 60% in these patientsThese 5 patients got intubated |
| Mondoni et al.21 | 109 | 108 flexible 1 rigid | NS | 60.0±13.6 years) | 71% male | NS | Diagnosis of COVID-19 in patients with two negative NP swabs-78Urgent life-saving bronchoscopy-31-Suspected secondary infection-Obstructive atelectasis-Suspicion for tracheal injury-Tracheostomy complications-Hemoptysis | NS | Haemophilus influenzae-1Aspergillus-3Candida-2 2 patients had both Aspergillus and Candida | BAL identified COVID-19 in 43/78 patients | Occurred in 5 (4.5%) of patientsTransient hypoxia in 3 patientsFever in 2 patients |
| Patrucco et al.22 | 131 | 131 | NS | 64.65 (53.71–73.98) | 70.99% male | NS | Diagnosis of COVID-19 in patients with negative NP swab-86Alternative diagnosis (hemoptysis/lung consolidation)-17Suspected secondary infection-26Lung atelectasis-2 | Erythematous endobronchial mucosaNonpurulent fluid secretion | Among all patients:Bacterial pathogen-30Fungal pathogen-17Non SARS-CoV-2 virus-14 | 76% of BAL positive patients had a double negative swab33/120 patients with 2 negative swabs were positive15 patients had definitive alternative diagnosis (8 lung cancer, 4 alveolar hemorrhage, 2 organizing pneumonia and 1 vasculitis) | NS |
| Chang et al.20 | 107 | 241 | 54 patients (50.5%) | 62IQR (47-69) | 83.1% male | NS | NS | NS | 35/54 (65%) of patients had a secondary bacterial infection | NS | No severe hypoxia, Pneumothorax, tube dislodgement or cardiac arrhythmia3 patient required ET tube advancement after procedure |
| Torrego et al.18 | 93 | 101 | 63 patients (67.7%) | NS | NS | NS | Suspected superinfection-63Airway secretion management with/without atelectasis-38 | Normal or mildly hyperemicbronchial mucosaWhite and gelatinous secretions, difficult to suction, was observed in 95% (88/93) of patientsMucohemorrhagic plugs occupying the main or lobar bronchi wereObserved in 12 patients | 18/63 (28.6%) of patients had a secondary bacterial infection | Newantibiotic was prescribed in 15/18 (83%) patients | Transient desaturation below 90%No procedure was abortedBAL was associated with more desaturation |
| Bruyneel et al.23 | 32 | 90 | 51 samples | 59+-8.5 years | NS | Hypertension (41%) Diabetes(28%) Obesity (22%) | Removal of mucus plug-60Microbiological sampling-22Worsening hypoxia-8Extubation-1 | Purulentplugs were removed during 33 proceduresIn themajority of these patients, very thick and dry plugs (like limestone) were stuck in the endotracheal tube | 30/51 (58.8%) of samples had a secondary bacterial infectionFungi were found in 16 samples | Newantibiotic was prescribed in 9/30 (30%) patients | 1 patient needed intubation after bronchoscopy1 patient had technical problems with the bronchoscope |
| Mehta et al.16 | 61 | 98 |  | 62.1+-11.5 years | 83.6% male | Diabetes (47.54%)Hypertension (44.26%)CKD (11.48%)Heart disease (14.75%) | Clinical worsening with new orincreasing infiltrates on CXR- 70\*Segmental collapse onCXR-27 Increased endotracheal secretions-36Hemoptysis-3  | Increased secretions in 87 (88.8%) casesThick purulent secretions in 53 (61%) Clear mucoid secretions in 16 (18.4%)Frothy secretions 12 (14%) Hemorrhagic in 6 (7%) Airway hyperemia was seen in 85 cases (87%) Mucus plugging was seen in 30 (30.6%) Mild bleeding was noted in 4 cases (4.1%) | 53/98 (54%) of patients had bacterial superinfection7 (7.1%) had fungal infection | Antibiotics were changed/escalated in 31 (31.6%) casesDecreased steroid use in 6 (6%) patientsAnticoagulation was reduced from intermediate to preventive in 6 (6%) patientsFluid administration was reduced, and diuretics added in 12 patients (12.2%) based on thevisual perception of pulmonary edema (frothy copious upwelling secretions). | No complications reported |
| Baron et al.19 | 24 | 28 | 28 | NS | NS | NS | Diagnosis of COVID-19 with negative swab-2Suspicion for secondary infection-26 | NS | Positive bacterial culture in 14/28 (50%)Positive Aspergillus culture in 7 (25%) | Modification of antibacterial therapy in 8 (29%)Modification of antifungal therapy in 5 (18%)Introduction of antiviral therapy 1 (4%)Initiation of corticosteroid therapy in 6 (21%)5/13 (38%) patients tested positive with a recent negative swab | No immediate complicationOne patient deteriorated within 24 hours after BAL |
| Loor et al.24 | 75 | 222 | NS | 60 (54- 67) years | 72% male | NS | Airway secretion clearance-150Hemoptysis-29Respiratory distress-13Assessment of airway injury-12Stent placement or revision-9Atelectasis-5Polypoid lesion biopsy-3Suspicion of eosinophilic pneumonia-1 | Normalmucosa in 138/222 (62%) Inflammatory/friable mucosa in 84/222 (38%). | NS | Change in antimicrobials 31 (14%)Adjustment of anticoagulant 5 (2.3%)Negative cultures leading to stopping antibiotic 3 (1.4%)Mucus plug extraction that improved ventilation 62 (27.9%) | Transient hypoxia (SpO2<90%) in 7 proceduresMild hemoptysis in 5  |
| Mahmood et al.11 | 53 | 53 | 53 | 62 (46-69) years | 67.9% male | Diabetes (32.1%)Hypertension (26.4%)CKD (22.6%)Heart disease (24.5%)Heart failure (7%) | Diagnosis of COVID-19 in patients with negative NP swab-41Suspicion for secondary infection with positive NP PCR-12 | NS | Bacterial infection-3 S aureus-2Pseudomonas-1Aspergillus-1Pneumocystis-1M avium-1 | BAL identified COVID-19 in 1/42(2.3%)  | Transient hypotension in 1 patient |
| Arenas De-Larriva et al.25 | 515 | 1027 | 300 | 61.5±11.2 years | 73% male | Diabetes(22.5%)\*Hypertension (47.6%)Cardiovascular (10.9%)Pulmonary (14%) | Diagnosis of COVID-19 in patients with negative NP swab-30**Positive swab-485 patients who underwent 997 bronchoscopies**Suspicion for secondary infection-147 (86 patients)Therapeutic indications-850\*(399 patients)Difficult ventilation-436 (43.7%)Mucus plug-389 (39%)Persistent infiltrate-233 (23.4%)Worsening infiltrate-100 (10%)Atelectasis-70 (70%)Difficulty weaning-63 (6.3%)Hemoptysis-60 (6%) | Normal mucosa in 84 (8.4%)Airway hyperemia in 114 (11.4%)Thick mucus in 597 (59.9%)Thin mucus in 224 (22.5%)Mucus plug in 175 (17.6%)Hemorrhagic secretion in 176 (17.7%)Intrabronchial clot in 60 (6%) | Bacterial infection-271 (27.2%)Fungus-128 (12.8%)Virus-36 (3.6%) | Bronchoscopy identified COVID-19 in 11/30 (36.7%) patients | NS |
| Cornelissen et al.26 | 58 | 58 | 58 | 60.5 (54-68) years | 74.1% male | NS | Microbiologic and cytologic analysis-58 | NS | Bacterial infection-(37.9%)Fungus-13.8%Virus-10.3% | NS | NS |

BAL, bronchoalveolar lavage; COVID-19, coronavirus disease 2019; CXR, chest X-ray; DAH, diffuse alveolar hemorrhage; ET, endotracheal tube; NIV, noninvasive ventilator; SARS-CoV-2, severe acute coronavirus disease 2019

\*the added total number based on indications is more than the number of procedures as some patients had more than one indication for bronchoscopy